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# Public Health Reports

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## The Relationship Between Tuberculin Reaction and Tuberculous Infection


By Sven Nissen Meyer, M. D.[1]


The findings from mass investigations on tuberculin sensitivity are often reported in terms of the frequency of positive reactors. On the basis of the degree of reaction to tuberculin, the population is divided into two groups intended to represent those infected with tuberculosis and those not infected.

Division of the population in this way, however, will always be to some extent arbitrary. First, results will depend upon choice of test, technique, and dosage of tuberculin. With increasing dosage there will be an increase in the number of reactions that can justifiably be classified as positive. It is not possible by means of the character of the reaction to decide which is the most appropriate dose for separating infected from noninfected individuals.

Second, there is no sharp dividing line between two kinds of reactions even to a given dose which could appropriately separate positive and negative. The reactions range along a continuous scale which it is difficult to dichotomize.

One method of interpreting the different degrees of reactions is to compare them with quite different criteria of tuberculous infection, such as radiologically detected pulmonary changes.

Another approach is to obtain distributions according to detailed categories of degree of reaction for different groups of the population. From an examination of these distributions, it may be possible to gain further insight into the relationship between level of sensitivity and the existence of tuberculous infection.

In some parts of the scale of reactions, the majority of individuals


[1] Fom the Aker Tuberculosis Department, Oslo Public Health Service, Norway.



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will presumably belong to the infected or to the noninfected group. It has been found that many distribution curves have two definite peaks, and in such cases the reactions in the modal classes can reasonably be designated as definitely positive and definitely negative. The group to which individuals belong is not so easily determined when the reaction is between these two extremes. These in-between reactions can suitably be called doubtful. It is likely that these reactions could be found among tuberculosis infected as well as noninfected individuals. In the latter case the reaction is often referred to as nonspecific, a terminology which will be used throughout the present paper.

The distribution curves will differ from one age-sex group to another and by geographical areas. That the prevalence of infection is not the same in all population groups is demonstrated by differences in the heights of the two peaks of the curves. It is conceivable, however, that not only will the prevalence of infection vary, but the degree of reaction among infected individuals may also vary, and this will be indicated by the different locations of the peak of positive readings along the scale of reactions.

In this study, these aspects are explored by the use of age-sex distributions of reactions to Pirquet's test in a section of Norway.

## Material and Methods

The material for this study has been provided through the courtesy of the Aker Tuberculosis Department of the Oslo Public Health Office and of its Chief, Dr. Erling Refsum. The group studied consists of a portion of the population over 14 years of age of the districts of Østre Aker, Nordstrand, and Vestre Aker, near the city of Oslo, who were tuberculin tested in connection with a mass photofluorographic survey in 1947–48.

Pirquet's technique was used in administering the tests. The tuberculin product was standardized Danish old tuberculin from the State Serum Institute in Copenhagen, of a strength 1.7 times the international standard. Immediately after preparation a 0.5 percent solution of phenol was added to the tuberculin; one drop of a 1 percent solution of adrenalin was added just before the test was given. Readings, consisting of measurements of the diameter of the erythema and induration, were made at 72 hours.

The majority of the examinations were performed by the same three nurses, but a part of the examinations were done by substitutes in the absence of the regular nurses. All of the participating nurses, however, were considered well experienced in this work and all had been carefully instructed. The examinations by the substitutes occurred at random throughout the study. Hence, no bias is introduced by a concentration of these examinations in any particular group.

The material is summarized in table 1, where the data are classified by age and sex. Figures on the total surveyed population are also presented. The attendance rate for women was higher than for men, tests having been obtained on 69 and 56 percent of the respective populations. For both sexes, the highest attendance was observed for those 30–59 years of age, and the lowest for those 15–29 years

Table 1. *Summary of material*

| Age | Population | Number examined: Total | Previously vaccinated with BCG | Not previously vaccinated with BCG |
|---|---|---|---|---|
| *Male* | | | | |
| 15–29 | 11,719 | 5,105 | 711 | 4,394 |
| 30–39 | 8,736 | 5,021 | 177 | 4,817 |
| 40–49 | 7,986 | 5,107 | 10 | 5,067 |
| 50–59 | 5,790 | 4,123 | 5 | 4,118 |
| 60 and over | 4,797 | 2,667 | 0 | 2,667 |
| Total | 39,038 | 22,026 | 933 | 21,093 |
| *Female* | | | | |
| 15–29 | 15,115 | 7,775 | 755 | 7,020 |
| 30–39 | 10,616 | 8,008 | 259 | 7,719 |
| 40–49 | 9,129 | 7,718 | 13 | 7,705 |
| 50–59 | 6,151 | 5,800 | 5 | 5,795 |
| 60 and over | 6,135 | 3,637 | 0 | 3,637 |
| Total | 47,756 | 32,968 | 1,062 | 31,906 |

In order to limit the investigation to a study of natural infection, information was obtained on previous BCG vaccinations, as shown in table 1. There is a possibility that additional vaccinations had been given among the study group, but the number cannot be very large as most vaccinations are given by the Health Office and are on record there.

The persons examined include some who did not actually receive the test at the time of the examination, but who produced a certificate of a positive reaction to a previous Pirquet test and were exempted from another one. In table 2, which shows the distribution of reactions according to age and sex, the number of such persons is entered in the bottom line. For the purpose of constructing relative frequency distributions, it was assumed that the reactions of persons previously tested and found positive were distributed from 3 mm. induration upwards, in the same proportion as those reactions which were measured. It is probable that individuals with a previously recorded positive reaction and those tested for the first time in the mass survey represent different groups. But in the absence of a better method the assumption that they were similar was applied to construct the distributions shown in table 3.

**Table 2.** *Distribution of Pirquet reactions according to size of induration, by sex and age*

| Induration in mm. | Age 15–29 | 30–39 | 40–49 | 50–59 | 60 and over | Total |
|---|---|---|---|---|---|---|
| *Male* | | | | | | |
| 0 | 1,588 | 689 | 310 | 149 | 194 | 2,930 |
| 1 | 690 | 430 | 225 | 129 | 220 | 1,694 |
| 2 | 122 | 102 | 60 | 88 | 125 | 497 |
| 3 | 52 | 34 | 29 | 36 | 62 | 213 |
| 4 | 217 | 273 | 355 | 419 | 410 | 1,674 |
| 5 | 108 | 166 | 204 | 224 | 149 | 851 |
| 6 | 235 | 308 | 476 | 425 | 246 | 1,690 |
| 7 | 126 | 298 | 374 | 306 | 196 | 1,300 |
| 8 | 201 | 451 | 573 | 478 | 248 | 1,951 |
| 9 | 82 | 163 | 233 | 153 | 74 | 705 |
| 10 | 191 | 409 | 540 | 464 | 187 | 1,791 |
| 11 | 24 | 59 | 80 | 53 | 21 | 237 |
| 12 | 74 | 178 | 241 | 188 | 79 | 760 |
| 13 | 2 | 11 | 15 | 14 | 4 | 46 |
| 14 | 8 | 22 | 33 | 30 | 13 | 106 |
| 15 | 18 | 76 | 111 | 93 | 34 | 332 |
| 16 | 3 | 27 | 30 | 34 | 11 | 105 |
| 17 | 1 | 5 | 3 | 3 | 2 | 14 |
| 18 | 2 | 28 | 35 | 33 | 9 | 107 |
| 19 | 1 | 2 | 3 | 2 | | 8 |
| 20 | 21 | 48 | 54 | 37 | 15 | 175 |
| 21 | | | | 1 | | 1 |
| 22 | 1 | 2 | 3 | 4 | 1 | 11 |
| 23 | | 1 | 1 | 1 | | 3 |
| 24 | 2 | 1 | 3 | 3 | | 9 |
| 25 | 2 | 19 | 19 | 16 | 4 | 60 |
| 26 | | 1 | 3 | 3 | 1 | 8 |
| 27 | | | | 1 | | 1 |
| 28 | | 3 | 9 | 2 | | 14 |
| 29 | | | | | | |
| 30 | 2 | 23 | 20 | 12 | 5 | 62 |
| 31 and over | 5 | 16 | 23 | 21 | 5 | 70 |
| Not tested[1] | 616 | 1,002 | 1,002 | 696 | 352 | 3,668 |
| Total | 4,394 | 4,847 | 5,067 | 4,118 | 2,667 | 21,093 |
| *Female* | | | | | | |
| 0 | 2,984 | 2,015 | 1,116 | 735 | 634 | 7,484 |
| 1 | 1,327 | 1,016 | 755 | 622 | 550 | 4,270 |
| 2 | 229 | 224 | 238 | 234 | 217 | 1,142 |
| 3 | 74 | 58 | 85 | 83 | 89 | 389 |
| 4 | 231 | 431 | 737 | 745 | 538 | 2,682 |
| 5 | 122 | 282 | 410 | 327 | 186 | 1,327 |
| 6 | 312 | 612 | 733 | 595 | 316 | 2,568 |
| 7 | 205 | 472 | 561 | 412 | 172 | 1,822 |
| 8 | 256 | 580 | 678 | 462 | 215 | 2,191 |
| 9 | 88 | 212 | 266 | 153 | 61 | 780 |
| 10 | 176 | 388 | 472 | 322 | 180 | 1,538 |
| 11 | 28 | 48 | 51 | 41 | 13 | 181 |
| 12 | 89 | 159 | 206 | 162 | 69 | 685 |
| 13 | 4 | 7 | 15 | 9 | 3 | 38 |
| 14 | 8 | 27 | 33 | 20 | 8 | 96 |
| 15 | 28 | 43 | 74 | 50 | 24 | 219 |
| 16 | 10 | 22 | 28 | 29 | 9 | 98 |
| 17 | 1 | 1 | 3 | 4 | 2 | 11 |
| 18 | 4 | 11 | 19 | 21 | 7 | 62 |
| 19 | | | 1 | | 1 | 2 |
| 20 | 11 | 40 | 49 | 35 | 16 | 151 |
| 21 | | | | 1 | | 1 |
| 22 | 1 | 5 | 4 | 3 | | 13 |
| 23 | | | | | | |
| 24 | 1 | 2 | 4 | 2 | 1 | 10 |
| 25 | 7 | 12 | 17 | 9 | 4 | 49 |
| 26 | 1 | | 2 | | | 3 |
| 27 | | | | | | |
| 28 | 3 | 4 | 6 | 1 | 1 | 15 |
| 29 | | | | | | |
| 30 | 7 | 17 | 14 | 19 | 1 | 58 |
| 31 and over | 5 | 28 | 28 | 36 | 8 | 105 |
| Not tested[1] | 808 | 1,033 | 1,100 | 663 | 312 | 3,916 |
| Total | 7,020 | 7,749 | 7,705 | 5,795 | 3,637 | 31,906 |

[1] With previous positive test.

Table 3. *Percentage of distribution of Pirquet reactions according to size of induration, by sex and age*

| Induration in mm. | Age 15–29 | 30–39 | 40–49 | 50–59 | 60 and over |
|---|---|---|---|---|---|
| *Male* | | | | | |
| 0 | 36.1 | 14.2 | 6.1 | 3.6 | 7.3 |
| 1, 2 | 18.5 | 11.0 | 5.6 | 5.2 | 13.0 |
| 3, 4 | 8.9 | 8.8 | 9.8 | 13.6 | 21.2 |
| 5, 6 | 11.3 | 13.5 | 17.3 | 19.4 | 17.7 |
| 7, 8 | 10.8 | 21.4 | 24.1 | 23.4 | 19.9 |
| 9, 10 | 9.0 | 16.3 | 19.7 | 18.4 | 11.7 |
| 11, 12 | 3.2 | 6.8 | 8.2 | 7.2 | 4.5 |
| 13–17 | 1.1 | 4.0 | 4.9 | 5.2 | 2.9 |
| 18–22 | .8 | 2.3 | 2.4 | 2.3 | 1.1 |
| 23–27 | .1 | .6 | .7 | .7 | .2 |
| 28 and over | .2 | 1.2 | 1.3 | 1.0 | .4 |
| Total | 100.0 | 100.1 | 100.1 | 100.0 | 99.9 |
| *Female* | | | | | |
| 0 | 42.5 | 26.0 | 14.5 | 12.7 | 17.4 |
| 1, 2 | 22.2 | 16.0 | 12.9 | 14.7 | 21.1 |
| 3, 4 | 6.4 | 8.2 | 13.3 | 17.0 | 20.0 |
| 5, 6 | 9.2 | 15.0 | 18.5 | 18.9 | 16.0 |
| 7, 8 | 9.7 | 17.6 | 20.0 | 17.9 | 12.4 |
| 9, 10 | 5.6 | 10.1 | 11.9 | 9.7 | 7.7 |
| 11, 12 | 2.5 | 3.5 | 4.2 | 4.2 | 2.6 |
| 13–17 | 1.1 | 1.7 | 2.5 | 2.3 | 1.5 |
| 18–22 | .3 | .9 | 1.2 | 1.2 | .8 |
| 23–27 | .2 | .2 | .4 | .2 | .2 |
| 28 and over | .3 | .8 | .8 | 1.1 | .3 |
| Total | 100.0 | 100.0 | 100.2 | 99.9 | 100.0 |

In table 3 the measurement data have been grouped because of irregularities in the observed frequencies. From table 2 it appears that 5, 7, 9, 11, 16–19 mm. of induration are recorded far less frequently than the figures in between, suggesting that the readers have an unconscious tendency to prefer even numbers and round figures. In order to eliminate these irregularities as much as possible, consecutive odd and even numbers (i. e., 1 and 2 mm., 3 and 4 mm. 5 and 6 mm., etc.) were combined and the frequency of reactions for each of these intervals was calculated. For reactions of more than 12 mm. of induration, 5 mm. intervals were used.

It is naturally open to discussion whether or not this is the correct grouping. Perhaps instead, 0 and 1 mm., 2 and 3 mm., 4 and 5 mm., etc., should have been combined. The conclusions in the present study would be the same with either method. The first was chosen because reactions of 0 mm. have been subjected to the most careful scrutiny, and for that reason should perhaps be separated.

## Frequency of Reactions

Figure 1 gives a preliminary view of the frequencies of Pirquet reactions according to the definitions currently in use in Norway. The variation with age is shown separately for men and women. The solid curves denote the frequency of definite positive reactions (i. e., reactions with recorded induration of at least 4 mm.); the

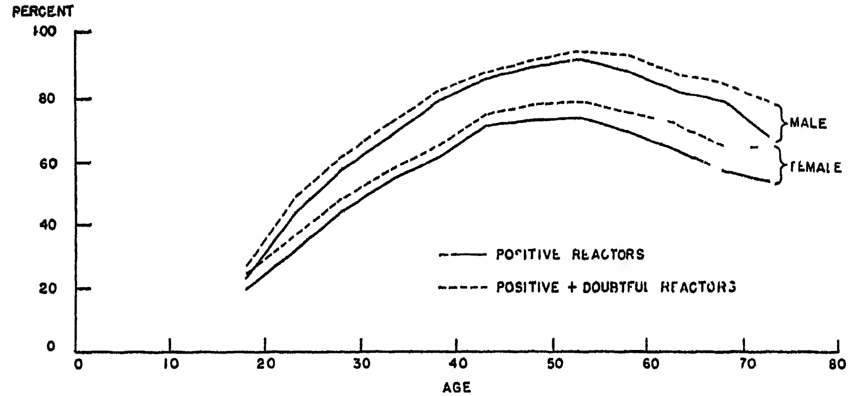


**Figure 1. Percentages of positive and doubtful reactors, male and female, by age.**

dotted curves, the frequency of definite positive and doubtful reactions (i. e., reactions with a recorded induration of 2–3 mm.).

From these curves it will be seen that the frequency of reactions increases up to 50 or 55 years of age. Above these ages the frequency of positive reactions decreases. Concurrently, there is an increase in the frequency of doubtful reactions.

Most of the previous studies reveal the same fall in the higher age groups. About 20 years ago, however, this decline began at a somewhat higher age—approximately 60–70 years (*1*).

For a more detailed analysis, the distributions according to degree of reaction are presented in figure 2 drawn from the data in table 3.

It is apparent from the graph that the frequency distribution varies with sex and age. First, the frequency of reactions of 0 mm. of induration decreases with increasing age, up to 60 years. Simultaneously the frequency of reactions with an induration of more than 4 mm. rises. Over the age of 60, however, the frequency of 0 mm. of induration increases. This was previously apparent from the age curve for the positive reactors.

In addition it appears, particularly for men, that a shift in the distribution of the definite positive reactions takes place with age, so that, in general, the reactions are strongest in persons between 30 and 59 years old. This can be seen best by noting the frequencies of 5–6, 7–8, and 9–10 mm. of induration. In men between 15 and 29, 5–6 mm. occurs most frequently. In the following age groups (up to 59) 7–8 mm. occurs most often, and the frequency of 9–10 mm. of induration is greater than that of 5–6 mm. At the higher ages, the shift is reversed. Above the age of 60 the majority of the readings are 3–4 mm. The same tendency can be seen from the frequency of induration measuring 11–12 mm. For men in the three lowest age groups (15–49) this frequency increases from 3.2 through 6.8 to 8.2

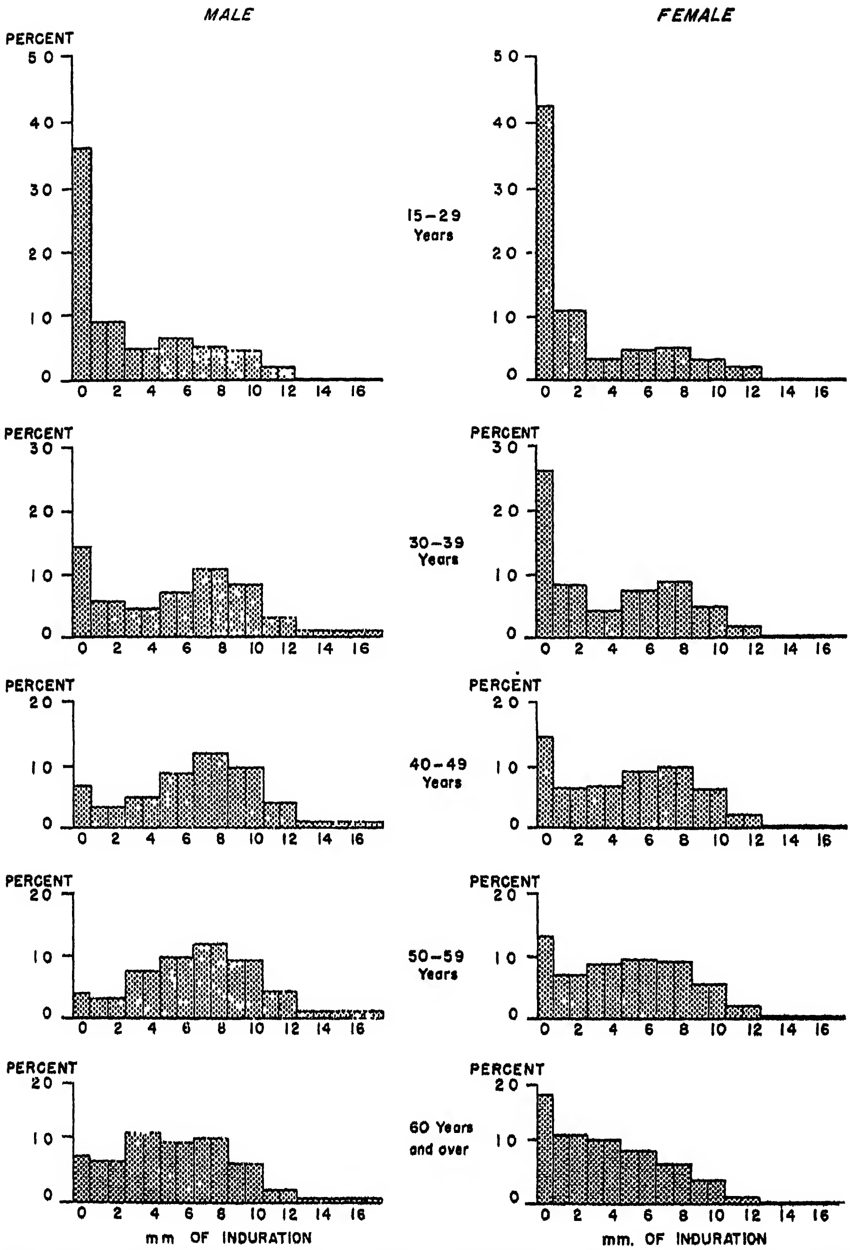


**Figure 2. Distributions of Pirquet reactions according to size of induration, by sex and age.**

percent. This is relatively more than the increase of all positive reactions. Altogether there are approximately 45, 75, and 90 percent positive individuals in the three age groups, respectively. In older persons there are relatively fewer reactions of 11–12 mm. of induration.

This shift of positive reactions with age is far less marked among women. The reactions seem to be somewhat stronger between the ages of 30 and 39 years than between 15 and 29. But the frequency of indurations measuring 9–10 mm. is uniformly less than the frequency of induration of 5–6 mm. From this it can be deduced that in this middle group, women generally have weaker positive reactions than men. The decrease of allergy in advanced age is even more marked among women than among men.

Table 4 shows more clearly the variation of the definite positive reactions with age and sex. Here the average measurements of all reactions of 4 mm. or more are given (calculated from table 2). For both men and women between the ages of 15 and 29, the intensity of the positive reactions is about the same. In the middle age groups the reactions are stronger in men. In old age the allergy decreases in both sexes.

Table 4. *Average size of induration among reactions of more than 3 mm. by sex and age*

| Age | Male | Female |
|---|---|---|
| | *mm.* | *mm.* |
| 15–29 | 7.82 | 7.87 |
| 30–39 | 9.00 | 8.09 |
| 40–49 | 8.99 | 7.87 |
| 50–59 | 8.58 | 7.69 |
| 60 and over | 7.48 | 6.97 |

The frequency distributions for the separate age groups by size of reaction differ significantly by chi-square tests. Also the difference between the distributions for men and women in the intermediate age groups is statistically significant.

Several possibilities may be considered to explain the shifts. It is not very likely that reactions of nontuberculous origin can explain the changes in the distribution of definite positive reactions. There is no evidence that Pirquet reactions of much more than 4 mm. of induration can be of nontuberculous etiology, at least not to an extent that can influence the distribution very much. Age in itself may play a role. For example, the condition of the skin may be different at different ages, which perhaps may be considered as an explanation for weak reactions in old persons. It may also be that repeated tuberculous infections play a role by maintaining or possibly increasing the sensitivity. This explanation conforms well with the findings. In the groups in which we have found the strongest reactions, men between 30 and 59, there are presumably a large number of individuals who have been repeatedly exposed to infection. At older ages the possibilities of contact decrease, and for many individuals the last infection has taken place long ago, and allergy may have waned.

In previous studies superinfection has been mentioned as a possible contributory factor to stronger tuberculin sensitivity. Several investigations, including Hertzberg's in Norway (*2*), have shown that the proportion of the reactors to a high dose of tuberculin only (Mantoux, 1 mg. of OT) varies in different population groups. It is smallest in highly exposed groups in which there is a high prevalence of reactors. Further, this proportion of "weak reactors" is greater among women than among men and it decreases with age, at least up to the age of 50–60 years.

This variation with age and sex does to a certain degree correspond to the results previously mentioned. But there is an essential difference. The shift in the level of sensitivity as demonstrated in this material applies to definite positive reactors. On the other hand, Hertzberg and many others reported a shift from a weak to a definite degree of sensitivity. In such a change, the occurrence of nonspecific reactions may also play a part.

Shifts in the distribution curve in the range of doubtful reactions with induration of about 2–3 mm. should be mentioned. It is possible that these may give some information about the nature of the doubtful reactions—the extent to which they are of tuberculous etiology and the extent to which they are nonspecific.

The distribution curve has in the younger age groups a kind of U-shape with two peaks, one at 0 mm. and one at 6 or 7 mm. A natural explanation of this finding is that the population consists of two groups, each of which would give a uni-modal distribution curve. In the composite population, a bi-modal curve will be obtained by combining the two single distributions. In a range around the minimum between the two peaks the distributions will overlap.

Between the ages of 40 and 49 the minimum between the peaks is found at 1–2 mm. In the younger age groups the fewest readings are at 3–4 mm. This may be interpreted to mean that in the younger age groups a majority of the doubtful reactions belong to the noninfected group.

A more detailed analysis in table 5 shows the frequency of reactions per millimeter from 0 to 4 in the two younger age groups for each sex (calculated from the figures in table 2). It can be seen that the frequency of 1, 2, and 3 mm. reactions on the whole decreases with decreasing frequency of 0 mm., but the frequency of 4 mm. reactions changes inversely with this decrease.

According to this, the best distinction between noninfected and infected individuals should be attainable in the younger age groups by using 4 mm. of induration as the boundary between negative and positive reactions. The majority of 1, 2, and 3 mm. reactions should probably be regarded as nonspecific and the majority, if not all, of the 4 mm. reactions, as specific.

Table 5. *Percentage of reactions of 0–4 mm., by sex in the two age groups 15–29 and 30–39*

| Sex | Age | 0 mm. | 1 mm. | 2 mm. | 3 mm. | 4 mm. |
|---|---|---|---|---|---|---|
| Female | 15-29 | 42.5 | 19.0 | 3.3 | 1.1 | 3.3 |
| Male | 15-29 | 36.0 | 15.7 | 2.8 | 1.2 | 5.0 |
| Female | 30-39 | 26.0 | 13.0 | 2.9 | .7 | 5.6 |
| Male | 30-39 | 14.2 | 8.9 | 2.1 | .7 | 5.7 |

The probable existence of the nonspecific reaction can also be illustrated in another way. The age group of men from 50 to 59 years might be considered an almost pure group of infected individuals, as only 3.6 percent have a reaction of 0 mm. of induration. Here it is seen that the reactions are fairly evenly distributed by size and that the maximum number is 7–8 mm. Close to 14 percent of those infected have a reaction of 3–4 mm. of induration, and about 5 percent have a reaction of 1–2 mm.

If this distribution is applied to the group of men 15–20 years old, of whom approximately 45 percent were definite positive reactors, then by reason of infection, 2.3 percent (i. e., 5 percent of 45 percent) of all individuals in this group should have reactions of about 1 or 2 mm. of induration, and 6.4 percent (i. e., 14 percent of 45 percent) reactions of about 3 or 4 mm. of induration. In reality, however, we find frequencies of 18.5 percent and 8.9 percent. In other words, most of the 1–2 mm. indurations and a fraction of the 3–4 mm. indurations in this age group must be regarded as being nonspecific.

Applying again the ratio of weak to definite reactors found among men 50–59 years of age to reactions among women between 15 and 19 years of age where 35 percent have a definite positive reaction, we find correspondingly that by reason of infection approximately 1.8 and 4.9 percent should have reactions of 1–2 mm. and 3–4 mm. of induration, respectively. In reality, however, we find 22.2 percent and 6.4 percent, and deduce that the number of nonspecific reactions corresponds with that found among men.

This is illustrated in figure 3, where the heavily shadowed areas indicate the estimated frequency distribution of infected individuals for each size of reaction and the lightly shaded areas indicate the distribution of noninfected individuals.

Some factors which could influence this calculation ought to be considered. The distribution curve for the infected part of the population is not quite the same for different age groups. A certain shift with age in the distribution of the size of the definite positive reactions has already been demonstrated, but, as a rough approximation, the calculation is perhaps permissible.

In the oldest age groups the distribution curve has a different shape. The minimum between definite negative reactions and definite positive reactions becomes less marked and the U-shape disappears.

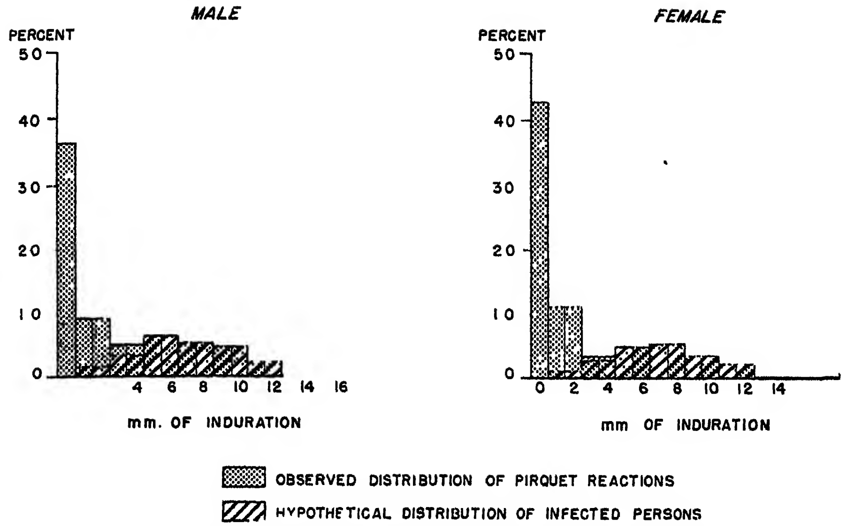


**Figure 3.** Distributions of Pirquet reaction, according to size of induration, in the age group 15–29 (male and female), showing the hypothetical distribution of infected persons.

The most convenient explanation is that this population essentially consists of one group, namely the infected. The majority of the doubtful and also of the definite negative reactions must be supposed to belong to the infected group. (Among the women there are perhaps some noninfected individuals over 60 years of age because the top at 0 mm. is very high.) This coincides with the fall in the age curve for reactors (fig. 1). The decrease in sensitivity among infected individuals is, therefore, even greater than indicated by the average measurements shown in table 4, because many infected persons over the age of 60 react with indurations of less than 4 mm. and are not included in the calculation of averages.

## Pulmonary Findings Related to Tuberculin Sensitivity

The other method of analysis is to assess the relation between tuberculin reactions and another index of tuberculous infection. An investigation can be made of the frequency of roentgenological pulmonary findings of possible tuberculous etiology among individuals with tuberculin reactions of varying intensity. Scheel (*3*) carried out investigations of this kind in 1937 on 1,697 university students in Oslo. In the United States similar studies have been made, but Mantoux tests were used and the reactions were grouped according to the tuberculin dose necessary to produce a positive reaction of a given size.

Among individuals with a definite positive Pirquet reaction (at least 4 mm. of induration), Scheel found that approximately 15 percent had calcified foci. Among those who had a negative Mantoux test

(1 mg. of OT), he found 0.7 percent with calcified foci. Among individuals with a doubtful Pirquet reaction, or with a negative Pirquet reaction but a positive Mantoux, he found calcified foci in approximately 1 percent. Thus this latter group, with a slight tuberculin sensitivity, had about the same frequency of calcification as the definitely negative individuals.

Goddard, Edwards, and Palmer (*4*) reported calcified foci in approximately 10 percent of a population of student nurses with a positive Mantoux reaction of 5 mm. or more of induration to 0.0001 mg. of PPD, and in 0.7 percent of nurses who reacted negatively to 0.005 mg. of PPD. Among questionable reactors, i. e., persons reacting negatively to 0.0001 mg. of PPD but positively to 0.005 mg. (more than 10 mm. of firm induration), the frequency was also low, between 1 and 2 percent. The three groups included only individuals with negative histoplasmin reactions.

If it is assumed that calcification is always detected in a constant percentage of those infected with tuberculosis, it could be concluded that tuberculous infection is about as infrequent among individuals with a weak allergy to tuberculin as among those who are definitely tuberculin negative. And among the definitely tuberculin positive, calcification is at least 10–20 times more frequent.

Objections can of course be raised to such a conclusion. For example, it is possible that a tuberculous infection resulting in calcified foci may also cause a stronger allergy than an infection which is not accompanied by detectable changes. One should bear this reservation in mind. But even so, this method is of value because it attempts to utilize criteria for tuberculous infection different from those offered by the various tuberculin tests.

The investigations mentioned and most others of the same kind have been carried out on fairly young persons. In view of the age variations which appeared in the Pirquet reactions, an investigation of the relationship in different age groups between pulmonary X-ray findings and Pirquet reactions is indicated. Both photofluorograms and tuberculin test results are available for 47,209 individuals. Table 6 shows the frequencies of pulmonary calcification in the different age groups (both sexes) according to whether they had (1) a negative, (2) a doubtful, or (3) a positive Pirquet test.

In all groups the frequency of calcification is considerably less than reported in the investigations previously mentioned. Among other things, this can be attributed to the fact that diagnoses have been made from photofluorographic film. A certain number of calcifications were undoubtedly missed by those interpreting the films and only definite positive findings were recorded. However, the photofluorographic readings were made without knowledge of the tuberculin reactions, so that no bias has been introduced into any group.

Table 6. *Frequencies of pulmonary calcifications among negative, doubtful, and positive reactors, by age (both sexes)*

| Age | Negative reactors | | | Doubtful reactors | | | Positive reactors | | |
|---|---|---|---|---|---|---|---|---|---|
| | Number examined | Calcifications | | Number examined | Calcifications | | Number examined | Calcifications | |
| | | Number | Percent | | Number | Percent | | Number | Percent |
| 15-29 | 6,423 | 18 | 0.28 | 463 | 2 | 0.43 | 4,224 | 101 | 2.40 |
| 30-44 | 4,513 | 17 | .38 | 579 | 8 | 1.38 | 11,810 | 466 | 3.92 |
| 45-59 | 2,346 | 43 | 1.83 | 586 | 14 | 2.39 | 11,235 | 547 | 4.85 |
| 60 and over | 1,311 | 62 | 4.72 | 406 | 23 | 5.65 | 3,313 | 217 | 6.82 |

It can be seen that in the two younger age groups calcified foci are far more common among those with a definite positive Pirquet reaction than among those with a negative reaction, the ratio being approximately 10:1. The frequency of calcification in individuals with a doubtful reaction is only slightly higher than in those with a negative reaction. This conforms to the investgiations of Scheel and of Goddard, Edwards, and Palmer, and it is also in accordance with the previous conclusions that the majority of doubtful tuberculin reactions in the younger age groups are nonspecific.

In the older age groups, on the other hand, the difference among the three groups decreases, and in the oldest group, the Pirquet reaction has practically no relation to the frequency of calcification. This agrees with the previous conclusion that most of the old persons with definite negative or with doubtful reactions really belong to the infected group. In other words, the older the person with a negative Pirquet reaction, the greater the chance of his having been infected. The same applies to an even greater extent to persons with a doubtful Pirquet reaction.

## Summary

The purpose of the investigation is to study the relation of tuberculous infection and the degree of reaction to the tuberculin test. The distribution of the population according to sensitivity was obtained and the differences by age and sex were studied.

Pirquet tests were performed on about 53,000 individuals over the age of 14 years. The diameter of the induration was used as a measure of the degree of sensitivity.

Except for the higher age groups, the distribution curve has a kind of U-shape, with two peaks, one at 0 mm., the second between 5 and 8 mm. The natural explanation for this is that the population consists of two different groups, each of which would give a unimodal distribution.

The shape of the distribution curve varies in different ways according to sex and age. For both sexes the peak at 0 mm. decreases with increasing age up to 50–60 years; above this age it increases again.

As the 0-peak decreases, the second peak at 5–8 mm. increases. But, in addition, the distribution for men between 30 and 59 is distinguished by a displacement of the second peak to the right, as compared with the distribution for males between 15 and 29 and those for females in all age groups. This indicates that stronger reactions occur more frequently in males aged 30–59 than in other groups. It is open to discussion whether this is a result of repeated exposure to infection in this age group or is due to other factors related to age.

In the older age groups, there is a shift in the opposite direction. The peak corresponding to definite positive reactions is displaced so much to the left in the scale that the minimum between the two peaks disappears and the curve loses its U-shape.

The minimum between the two peaks is found at 3–4 mm. in the age group of 15–29 years, at 1–2 mm. in the age group of 40–49 years. Moreover, with this shift of the minimum between the peaks, the frequency of 1–3 mm. reactions decreases along with decreasing frequency of 0 mm. reactions, while the frequency of 4 mm. reactions increases. This may be interpreted to mean that the majority of 1–3 mm. reactors at the younger ages belongs to the noninfected group. On the other hand, in old age most reactors of 0–3 mm. probably belong to the infected group, corresponding to this shift of the second peak toward smaller reactions.

These conclusions concerning the interpretation of the weak reactions are substantiated by study of the frequency of pulmonary calcifications among individuals with reactions of (1) 0–1 mm. of induration, (2) 2–3 mm. of induration, and (3) more than 3 mm. of induration. At the younger ages the frequency is much higher in the third group than in the first two, which are only slightly different. In old age the frequency of calcification is nearly the same in all three groups; this suggests that most individuals with 0–3 mm. reactions belong to the infected group.

## Supplement

The results of this study were given in a lecture in Oslo in December 1949. In January 1950 a paper was published by Carroll E. Palmer and O. Strange Petersen (*5*), which dealt with the same problem. They have examined the distributions of sensitivity to histoplasmin and tuberculin among student nurses, and have compared these results by geographic areas. A quantitative method of analyzing the nature of doubtful reactions is given in their paper.

I have had the opportunity to discuss my results with these authors and they have given very valuable help to the final preparation of this paper, which was prepared during my appointment as Consultant in the Tuberculosis Research Office of the World Health Organization. I hope the authors will accept my most sincere thanks.

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# Failure of Streptomycin to Enhance the Infectivity of *Histoplasma capsulatum* in Mice

By Charlotte C. Campbell and Samuel Saslaw, Capt., M.C., AUS*

Earlier reports (*1*, *2*) have described the growth enhancement of certain pathogenic fungi in synthetic media containing varying concentrations of streptomycin. Fungi studied at this laboratory (*1*) have included three strains of *Histoplasma capsulatum*, two of which exhibit increased growth in the presence of the antibiotic. The stimulatory effect was observed with the mycelial phase of the organism; the yeast phase was not subjected to *in vitro* tests since the organism invariably reverted to the mycelial type in the culture medium used for testing growth, even at an incubation temperature of 37° C.

Considering this and the fact that histoplasmosis and pulmonary tuberculosis (for which streptomycin is frequently used as a therapeutic agent), are quite similar in clinical appearance, the authors undertook to investigate the *in vivo* effects of the drug. The experiments reported here were therefore conducted to see if streptomycin could accelerate or otherwise alter the mortality rate of mice experimentally infected with *H. capsulatum*.

In all the experiments, young white Swiss mice (Bagg strain) weighing 14 to 17 grams were used. These were separated into groups of five at random, and each group was placed in an individual jar. For the purpose of the initial experiment, 20 of these groups, or a total of 100 mice, were infected with yeast-phase histoplasma organisms and given daily injections of streptomycin in five different dosages, with four groups of mice observed at each dosage level. Daily streptomycin dosages began immediately after infection and amounted to 0.05, 0.125, 0.25, 0.5, and 1.0 mg., respectively.

Eight additional groups, or a total of 40 mice, served as infected controls, and were given no streptomycin at all. Instead, these mice received daily injections of 0.5 ml. of physiologic saline solution. Finally, to provide for drug controls, four more groups, or 20 animals, were given only streptomycin in daily doses of 1.0 mg. (the highest dosage used in the groups receiving both *H. capsulatum* and streptomycin).

All infections were induced by the method described in a previous report from this laboratory (*3*), in which yeast-phase organisms (strain

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G–8)[1] were suspended in 5 percent hog gastric mucin, and challenge doses consisted of approximately 3.5 million organisms suspended in 0.5 ml. of mucin. The unusually large inoculum was used in order to obtain mortality in excess of 50 percent among infected, untreated animals. The strain employed is one in which the *in vitro* stimulatory effect of streptomycin has appeared to be most marked.

The streptomycin used in these studies, commercial streptomycin sulfate (Pfizer), was dissolved in sterile, distilled water at concentrations varying from 0.1 to 10.0 mg. per ml. and stored in sterile, rubber-capped vials at 4° to 6° C. New solutions were prepared every 6th day. Daily dosages consisted of the absolute amounts of streptomycin contained in 0.5 ml. of the various concentrations. It should be noted that the concentrations of streptomycin contained in the daily 0.5 ml. injections paralleled those at which growth enhancement of *H. capsulatum* had been observed *in vitro*, 0.05 to 5.0 mg. (*1*).

All injections were administered intraperitoneally, with streptomycin given daily for a period of 30 days. During this period, all fatalities were necropsied and spleens cultured for *H. capsulatum*. At the close of the 30-day observation period, survivors were sacrificed and examined in similar manner.

The greatest number of fatalities occurred between the 9th and 21st days after injection of the infective agent. Relatively few animals died before or after this time interval in either the untreated or streptomycin therapy groups, and there were no deaths at all among the drug controls.

As indicated in table 1, the death rate among the infected controls was 85 percent, as compared with a range of 65 to 85 percent for the groups receiving daily injections of streptomycin. Since there was no significant difference in either the interval of time between injection and death or the total percentage of fatalities in any of the groups, it would appear that the daily administration of streptomycin under the specified conditions does not accelerate the death rate of mice experimentally infected with histoplasma.

In an effort to see whether the use of larger antibiotic dosages would alter these findings, we next increased the daily concentrations to 0.1, 1.0, 2.5 and the exceedingly high dose of 5.0 mg. The results of three separate experiments based on these higher dosages are shown in table 2. In all three experiments, the total death rate for infected controls (66.7 percent), was similar to the total rate for infected mice receiving 0.1 to 2.5 mg. of streptomycin (73.3 percent, 63.3 percent, 61.7 percent, respectively). Similarly, a single injection of 2.5 mg. of streptomycin given immediately after infection did not materially increase the percentage of fatalities in that group. Even

[1] A human isolate identified at this institution.

Table 1. *Comparative mortality among mice receiving streptomycin and those receiving no streptomycin following infection with* H. capsulatum *(streptomycin dosages of 1.0 mg. and less)*

| Experimental subjects | Daily streptomycin dosage (mg.) | Number dead/number observed: Individual groups | Number dead/number observed: All groups | Total death rate (percent) |
|---|---|---|---|---|
| Infected animals (dosage approximately 3.5 million yeast-phase *H. capsulatum* organisms suspended in 0.5 ml. of 5 percent hog gastric mucin). | [1] None | 5/5, 1/5, 4/5, 3/5; 5/5, 5/5, 4/5, 1/5 | 34/40 | 85.0 |
| | 0.05 | 5/5, 5/5, 3/5, 1/5 | 17/20 | 85.0 |
| | .125 | 1/5, 2/5, 5/5, 4/5 | 15/20 | 75.0 |
| | .25 | 4/5, 2/5, 3/5, 4/5 | 13/20 | 65.0 |
| | .5 | 3/5, 5/5, 5/5, 4/5 | 17/20 | 85.0 |
| | 1.0 | 4/5, 3/5, 3/5, 5/5 | 15/20 | 75.0 |
| Drug controls [2] | 1.0 | 0/5, 0/5, 0/5, 0/5 | 0/20 | 0 |

[1] Infected controls. Received daily injections of 0.5 ml. of physiologic saline solution instead of streptomycin.
[2] Uninfected animals. Received streptomycin only.

in the group receiving daily streptomycin dosages of 5.0 mg. in experiment 3, the death rate was not substantially different from that sustained by the infected controls (55.0 percent and 50.0 percent, respectively). It therefore appears that relatively large doses of the antibiotic also fail to accelerate the death rate of infected mice.

Table 2. *Comparative mortality among mice receiving streptomycin and those receiving no streptomycin following infection with* H. capsulatum *(streptomycin dosages of 0.1 5.0 mg.)*

| Experimental subjects | Daily streptomycin (dosage (mg.)) | Number dead/number observed: Experiment 1 | Experiment 2 | Experiment 3 | All experiments | Death rates (percent): Experiment 1 | Experiment 2 | Experiment 3 | All experiments |
|---|---|---|---|---|---|---|---|---|---|
| Infected animals (dosage approximately 3.5 million yeast-phase *H. capsulatum* organisms suspended in 0.5 ml. of 5-percent hog gastric mucin). | [1] None | 28/37 | 26/39 | 10/20 | 64/96 | 75.7 | 66.7 | 50.0 | 66.7 |
| | 0.1 | 15/20 | 15/20 | 14/20 | 44/60 | 75.0 | 75.0 | 70.0 | 73.3 |
| | 1.0 | 15/20 | 15/20 | 8/20 | 38/60 | 75.0 | 75.0 | 40.0 | 63.3 |
| | 2.5 | 13/20 | 16/20 | 8/20 | 37/60 | 65.0 | 80.0 | 40.0 | 61.7 |
| | 5.0 | - | | 11/20 | 11/20 | | | 55.0 | 55.0 |
| | [3] 2.5 | 16/20 | 14/20 | - | 30/40 | 80.0 | 70.0 | - | 75.0 |
| Drug controls [2] | [4] 2.5 and 5.0 | 0/20 | 0/20 | 0/20 | 0/60 | 0 | 0 | 0 | 0 |

[1] Infected controls. Received daily injections of 0.5 ml. sterile, physiologic saline instead of streptomycin.
[2] Uninfected animals. Received streptomycin only.
[3] Single injection only, immediately following infection.
[4] Lower dose used in experiments 1 and 2, and higher dose in experiment 3.

Finally, one additional experiment was undertaken to determine whether the large inoculum of *H. capsulatum* (3.5 million organisms) used in the earlier trials had, perhaps, exaggerated mortality to a point where any acceleration of the death rates caused by the antibiotic might be concealed. In these final experiments, then, a smaller inoculum was used, and the high streptomycin dosage trial repeated.

Five lots of mice, each containing 20 animals, were injected with one-tenth the original inoculum, or approximately 350,000 organisms (this inoculum had not in the past produced mortality in excess of 50 percent). Once again, no significant difference was noted in mortality.

Seven of the infected controls died, as compared with 5, 4, 4, and 4 among those receiving 30 daily injections of 0.1, 1.0, 2.5, and 5.0 mg. of streptomycin, respectively.

In all the experiments, survivors in both the infected controls and the groups receiving streptomycin appeared well and healthy at the end of 30 days. However, the spleens of selected animals in both groups yielded cultures positive for *H. capsulatum*.

## Summary and Conclusions

Under the conditions of these studies, streptomycin concentrations varying from 0.05 to 5.0 mg., administered in daily intraperitoneal doses for 30 days, failed to accelerate the fatality rate of mice experimentally infected with the yeast phase of *H. capsulatum*. There was no significant difference in the death rates of mice receiving *H. capsulatum* alone and those receiving streptomycin following infection. Although streptomycin may enhance the growth of the mycelial phase of *H. capsulatum in vitro*, no increased virulence has been observed with *in vivo* studies employing the yeast phase of the fungus.

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# Incidence of Disease

*No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring*

## UNITED STATES

### Reports From States for Week Ended December 16, 1950

*Measles*

For the current week 3,507 new cases of measles were reported, as compared with 3,008 for the previous week, and 1,774 for the same week last year. Nearly one-third of the cases for the current week (1,105) occurred in the East North Central States.

*Other diseases*

For the current week 27 cases of infectious encephalitis were reported, 15 of which occurred in California. A total of 368 cases of poliomyelitis was reported, which represents a 23 percent decrease since the previous week. The cumulative total for the "disease" year is 31,710 as compared with 41,094 for the same period last year.

*Comparative Data for Cases of Specified Reportable Diseases: United States*

[Numbers after diseases are International List numbers, 1948 revision]

| Disease | Total for week ended— | | 5-year median 1945–49 | Seasonal low week | Cumulative total since seasonal low week | | 5-year median 1944–45 through 1948–49 | Cumulative total for calendar year | | 5-year median 1945–49 |
|---|---|---|---|---|---|---|---|---|---|---|
| | Dec. 16, 1950 | Dec. 17, 1949 | | | 1949–50 | 1948–49 | | 1950 | 1949 | |
| Anthrax (062) | 1 | ---- | (1) | (1) | (1) | (1) | (1) | 44 | 51 | (1) |
| Diphtheria (055) | 128 | 153 | 338 | 27th | [2] 2,700 | 3,982 | 5,080 | [2] 5,828 | 7,750 | 11,977 |
| Acute infectious encephalitis (082) | 27 | 7 | 8 | (1) | (1) | (1) | (1) | 980 | 738 | 612 |
| Influenza (480–483) | 3,157 | 2,441 | 2,875 | 30th | 31,614 | 25,621 | 20,177 | 277,873 | 101,488 | 217,174 |
| Measles (085) | 3,507 | 1,774 | 2,592 | 35th | 21,701 | 14,344 | 21,111 | 309,932 | 602,802 | 500,719 |
| Meningococcal meningitis (057.0) | 81 | 78 | 70 | 37th | 822 | 787 | 787 | 3,621 | 3,303 | 3,807 |
| Pneumonia (490–493) | 1,230 | 1,523 | ------- | (1) | (1) | (1) | (1) | 77,512 | 74,572 | ------- |
| Acute poliomyelitis (080) | 368 | 243 | 197 | 11th | [2] 31,710 | 41,094 | 24,403 | [2] 32,841 | 42,007 | 24,900 |
| Rocky Mountain spotted fever (104) | 2 | 2 | 2 | (1) | (1) | (1) | (1) | 451 | 560 | 560 |
| Scarlet fever (050) | 1,314 | 1,292 | 2,070 | 32d | 12,987 | 14,142 | 18,949 | 53,157 | 71,808 | 70,935 |
| Smallpox (084) | 1 | ------- | 3 | 35th | [2] 8 | 7 | 10 | [2] 34 | 48 | 163 |
| Tularemia (059) | 13 | 34 | 34 | (1) | (1) | (1) | (1) | 854 | 1,074 | 1,052 |
| Typhoid and paratyphoid fever (040, 041)[3] | 48 | 36 | 53 | 11th | [2] 2,844 | 3,285 | 3,317 | [2] 3,353 | 3,773 | 3,802 |
| Whooping cough (056) | 1,823 | 1,718 | 2,125 | 39th | 18,787 | 18,672 | 20,544 | 115,982 | 65,274 | 96,419 |

[1] Not computed. [2] Deductions: Diphtheria, North Carolina, week ended Sept. 2, 1 case; poliomyelitis, Georgia, week ended Nov. 25, 1 case; smallpox, Kansas, week ended Nov. 25, 4 cases; typhoid fever, North Carolina, week ended Aug. 19, 1 case and week ended Nov. 25, 1 case of paratyphoid. [3] Including cases reported as salmonellosis.

There was one case of anthrax in West Virginia, one case of psittacosis in Pennsylvania, and one case of smallpox in North Dakota.

## Report of Epidemics

*Influenza*

Dr. J. R. Enright, Department of Health, Hawaii, has reported information on "Influenza Incidence" in the South Pacific Islands which he received from the South Pacific Health Service, Suva, Fiji. The latest figures available are those for October which are as follows in the various island groups: Cook Islands, incl. Niue (1,060 cases); Fiji (94), Gilbert and Ellice Islands (Prevalent); Nauru Islands (366); New Guinea (Netherlands) (28); New Hebrides (69); New Caledonia (4); Oceania (French) (496); Papua (New Guinea) (47); Western Samoa (68); Eastern Samoa (41); British Solomon Islands (4). This report states that an epidemic of influenza followed a visit by a naval vessel to Oceania Island which lies between the Gilberts and Nauru. The nature of the virus causing the outbreak is being investigated by Dr. Burnet of Melbourne, Australia.

(Note: An outbreak of an upper respiratory infection in Canton Island in June 1950, and an epidemic of influenza in Hawaii, were reported in the Communicable Disease Summary for the week ended November 18, 1950.)

*Gastro-enteritis*

Dr. V. A. Getting, Commissioner of Public Health, Massachusetts, has reported that gastro-enteritis is epidemic in many parts of the State. Cases are mild with nausea, vomiting, and diarrhea. Average durations of symptoms is 24 hours.

## *Deaths During Week Ended December 16, 1950*

| | *Week ended Dec. 16, 1950* | *Corresponding week, 1949* |
|---|---|---|
| Data for 91 large cities of the United States: | | |
| Total deaths | 9, 588 | 9, 426 |
| Median for 3 prior years | 9, 497 | ---------- |
| Total deaths, first 50 weeks of year | 458, 578 | 458, 805 |
| Deaths under 1 year of age | 674 | 599 |
| Median for 3 prior years | 660 | ---------- |
| Deaths under 1 year of age, first 50 weeks of year | 31, 329 | 32, 665 |
| Data from industrial insurance companies: | | |
| Policies in force | 69, 600, 812 | 69, 962, 439 |
| Number of death claims | 12, 856 | 12, 845 |
| Death claims per 1,000 policies in force, annual rate | 9. 6 | 9. 6 |
| Death claims per 1,000 policies, first 50 weeks of year, annual rate | 9. 2 | 9. 1 |

## Reported Cases of Selected Communicable Diseases: United States, Week Ended December 16, 1950

[Numbers under diseases are International List numbers, 1948 revision]

| Area | Diphtheria (055) | Encephalitis, infectious (082) | Influenza (480-483) | Measles (085) | Meningitis, meningococcal (057.0) | Pneumonia (490-493) | Poliomyelitis (080) |
|---|---|---|---|---|---|---|---|
| **United States** | **128** | **27** | **3,157** | **3,507** | **81** | **1,230** | **368** |
| **New England** | **4** | **1** | **2** | **112** | **3** | **39** | **12** |
| Maine | | | | 2 | 1 | 1 | 1 |
| New Hampshire | | | 1 | | | | |
| Vermont | | | | 58 | | | |
| Massachusetts | 2 | 1 | | 38 | 2 | | 6 |
| Rhode Island | 1 | | | 5 | | 1 | 1 |
| Connecticut | 1 | | 1 | 9 | | 37 | 4 |
| **Middle Atlantic** | **8** | **1** | **3** | **650** | **25** | **220** | **80** |
| New York | 4 | 1 | [1]3 | 163 | 8 | 195 | 54 |
| New Jersey | 2 | | | 172 | 1 | 10 | 11 |
| Pennsylvania | 2 | | | 315 | 16 | 15 | 15 |
| **East North Central** | **6** | **4** | **16** | **1,105** | **13** | **91** | **80** |
| Ohio | 2 | | 1 | 348 | 4 | | 23 |
| Indiana | 1 | | | 5 | | 5 | 8 |
| Illinois | 2 | 1 | 1 | 344 | 7 | 61 | 10 |
| Michigan | 1 | 2 | 4 | 121 | 1 | 14 | 29 |
| Wisconsin | | 1 | 10 | 287 | 1 | 11 | 10 |
| **West North Central** | **10** | | **13** | **387** | **6** | **78** | **32** |
| Minnesota | 6 | | | 83 | 2 | 5 | 2 |
| Iowa | | | | 1 | | 5 | 8 |
| Missouri | 4 | | 4 | 112 | 1 | 12 | 7 |
| North Dakota | | | 8 | 7 | | 55 | |
| South Dakota | | | | 5 | 1 | | 10 |
| Nebraska | | | | | 1 | | |
| Kansas | | | 1 | 179 | 1 | 1 | 5 |
| **South Atlantic** | **40** | **4** | **433** | **102** | **10** | **116** | **39** |
| Delaware | | | | | | | |
| Maryland | 2 | | 1 | 2 | | 26 | 7 |
| District of Columbia | | | 1 | 5 | | 8 | |
| Virginia | 1 | | 231 | 27 | 1 | 13 | 10 |
| West Virginia | 9 | | 130 | 5 | | 17 | 1 |
| North Carolina | 12 | 1 | | 30 | 1 | | 6 |
| South Carolina | 7 | | 44 | 6 | 3 | 17 | |
| Georgia | 7 | | 18 | 24 | 2 | 7 | 5 |
| Florida | 2 | 3 | 5 | 3 | 3 | 28 | 7 |
| **East South Central** | **19** | **2** | **57** | **142** | **3** | **60** | **13** |
| Kentucky | 7 | | | 101 | | | 2 |
| Tennessee | 7 | 1 | 23 | 22 | 2 | | 5 |
| Alabama | 1 | 1 | 29 | 3 | 1 | 11 | 2 |
| Mississippi | 4 | | 5 | 16 | | 19 | 1 |
| **West South Central** | **29** | | **2,350** | **324** | **13** | **422** | **18** |
| Arkansas | 5 | | 137 | 65 | 2 | 65 | 1 |
| Louisiana | 2 | | | 1 | | 31 | 2 |
| Oklahoma | 5 | | 111 | 51 | 2 | 21 | 2 |
| Texas | 17 | | 2,102 | 201 | 9 | 302 | 13 |
| **Mountain** | **4** | | **213** | **238** | **1** | **71** | **16** |
| Montana | | | 8 | 5 | | 1 | 1 |
| Idaho | | | 7 | 11 | | 12 | 3 |
| Wyoming | | | | 7 | | | |
| Colorado | 2 | | 10 | 157 | 1 | 16 | 3 |
| New Mexico | 2 | | | 12 | | 11 | 4 |
| Arizona | | | 211 | 9 | | 30 | 3 |
| Utah | | | 4 | 7 | | | 2 |
| Nevada | | | | | | 1 | |
| **Pacific** | **8** | **15** | **10** | **417** | **7** | **43** | **78** |
| Washington | 2 | | | 126 | 3 | 2 | 12 |
| Oregon | | | 8 | 16 | | 14 | 8 |
| California | 6 | 15 | 2 | 275 | 4 | 27 | 58 |
| Alaska | | | | | 2 | | 9 |
| Hawaii | | | | | | | |

[1] New York City only.

*Anthrax:* West Virginia, 1 case, *Psittacosis:* Pennsylvania, 1 case

## Reported Cases of Selected Communicable Diseases: United States, Week Ended December 16, 1950—Continued

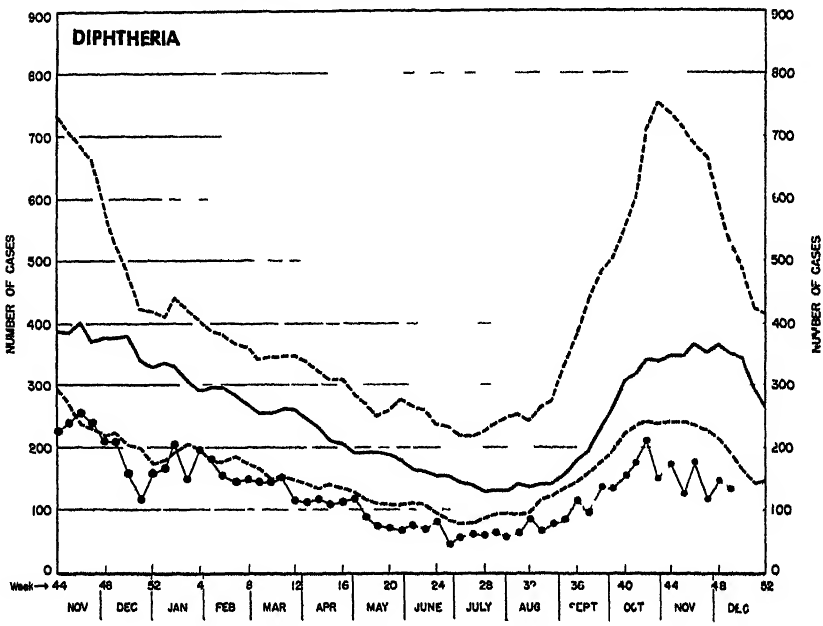
[Numbers under diseases are International List numbers, 1948 revision]

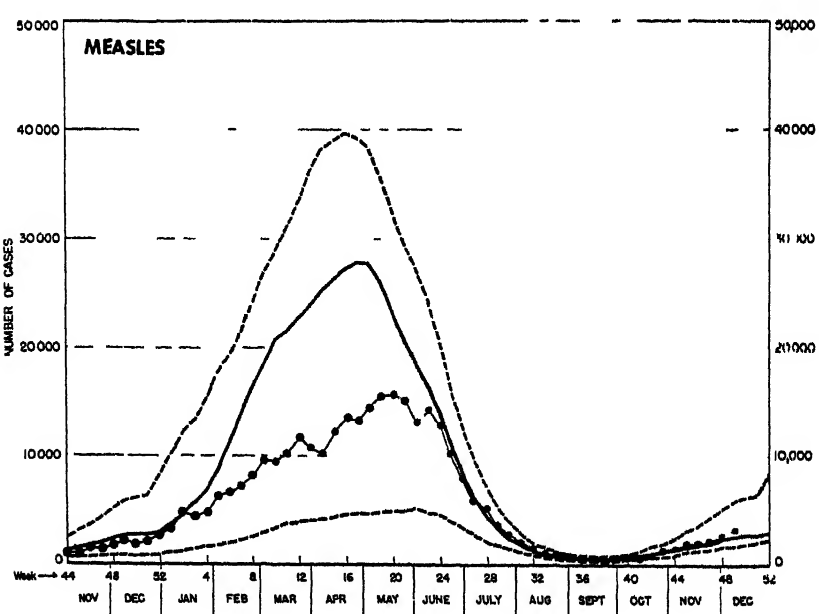
| Area | Rocky Mountain spotted fever (104) | Scarlet fever (050) | Smallpox (084) | Tularemia (059) | Typhoid and paratyphoid fever [1] (040, 041) | Whooping cough (056) | Rabies in animals |
|---|---|---|---|---|---|---|---|
| **United States** | 2 | 1,314 | 1 | 13 | 48 | 1,823 | 148 |
| **New England** | | 153 | | | 3 | 282 | |
| Maine | | 12 | | | 2 | 32 | |
| New Hampshire | | 6 | | | | 1 | |
| Vermont | | 7 | | | | 82 | |
| Massachusetts | | 112 | | | 1 | 100 | |
| Rhode Island | | 4 | | | | 31 | |
| Connecticut | | 12 | | | | 36 | |
| **Middle Atlantic** | | 174 | | 1 | 7 | 307 | 15 |
| New York | | [2] 96 | | | 3 | 110 | 15 |
| New Jersey | | 28 | | | | 113 | |
| Pennsylvania | | 50 | | 1 | 4 | 84 | |
| **East North Central** | | 277 | | 2 | 6 | 299 | 52 |
| Ohio | | 77 | | | 4 | 48 | 5 |
| Indiana | | 12 | | | 1 | 23 | [3] 43 |
| Illinois | | 51 | | 2 | 1 | 24 | 1 |
| Michigan | | 112 | | | | 103 | 2 |
| Wisconsin | | 25 | | | | 101 | 1 |
| **West North Central** | | 100 | 1 | 1 | 5 | 112 | 11 |
| Minnesota | | 17 | | | | 13 | 1 |
| Iowa | | 13 | | | 1 | 9 | 10 |
| Missouri | | 18 | | 1 | 3 | 28 | |
| North Dakota | | 11 | 1 | | | | |
| South Dakota | | 5 | | | | 3 | |
| Nebraska | | 5 | | | | 2 | |
| Kansas | | 31 | | | 1 | 57 | |
| **South Atlantic** | 1 | 175 | | 4 | 9 | 312 | 13 |
| Delaware | | 1 | | | | 2 | |
| Maryland | | 20 | | | 1 | 36 | |
| District of Columbia | | 11 | | | | 13 | |
| Virginia | | 12 | | 2 | 2 | 115 | 1 |
| West Virginia | | 3 | | | | 66 | 3 |
| North Carolina | | 94 | | | 1 | 39 | |
| South Carolina | | 8 | | | | 11 | 4 |
| Georgia | 1 | 17 | | 2 | 3 | 16 | 5 |
| Florida | | 9 | | | 2 | 14 | |
| **East South Central** | 1 | 96 | | 2 | 4 | 68 | 19 |
| Kentucky | | 24 | | | | 26 | 8 |
| Tennessee | | 42 | | 2 | 2 | 21 | 3 |
| Alabama | | 19 | | | | 15 | 6 |
| Mississippi | 1 | 11 | | | 2 | 3 | 2 |
| **West South Central** | | 71 | | 2 | 8 | 308 | 34 |
| Arkansas | | 2 | | 1 | | 40 | 2 |
| Louisiana | | 6 | | | 6 | 2 | |
| Oklahoma | | 4 | | 1 | 1 | 5 | 1 |
| Texas | | 59 | | | 1 | 261 | 31 |
| **Mountain** | | 56 | | 1 | 1 | 57 | |
| Montana | | 4 | | 1 | 1 | 1 | |
| Idaho | | 8 | | | | 2 | |
| Wyoming | | | | | | 1 | |
| Colorado | | 13 | | | | 15 | |
| New Mexico | | 4 | | | | 19 | |
| Arizona | | 4 | | | | 16 | |
| Utah | | 23 | | | | 3 | |
| Nevada | | | | | | | |
| **Pacific** | | 212 | | | 5 | 78 | 4 |
| Washington | | 64 | | | 1 | 30 | |
| Oregon | | 23 | | | | 9 | |
| California | | 125 | | | 4 | 39 | 4 |
| Alaska | | | | | 1 | 7 | |
| Hawaii | | | | | | | |

[1] Including cases reported as salmonellosis. [2] Including cases reported as streptococcal sore throat.
[3] Report for November.

# Communicable Disease Charts

*All reporting States, November 1949 through December 9, 1950*




The upper and lower broken lines represent the highest and lowest figures recorded for the corresponding weeks in the 5 preceding years. The solid line is a median figure for the 5 preceding years. All three lines have been smoothed by a 3-week moving average. The dots represent numbers of cases reported for the weeks of 1950.

# FOREIGN REPORTS

## CAMEROON (FRENCH)

*Influenza.* The numbers of cases of influenza reported during August and September were 191 and 197, respectively. For the corresponding months of 1947, 1948, and 1949, influenza was almost nonexistent except for September 1949, when 248 cases were reported. The cases reported for August and September 1950 were chiefly in the Bamoun Region.

## CANADA

*Reported Cases of Certain Diseases—Week Ended Dec. 2, 1950*

| Disease | Newfoundland | Prince Edward Island | Nova Scotia | New Brunswick | Quebec | Ontario | Manitoba | Saskatchewan | Alberta | British Columbia | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Brucellosis |  |  |  |  | 4 | 1 |  |  |  |  | 5 |
| Chickenpox | 5 |  | 67 |  | 253 | 467 | 49 | 106 | 149 | 273 | 1,369 |
| Diphtheria |  |  |  |  | 4 |  |  | 1 |  |  | 5 |
| Dysentery, bacillary |  |  |  |  | 3 | 10 | 1 |  |  | 18 | 32 |
| Encephalitis, infectious |  |  |  |  |  |  |  | 1 |  |  | 1 |
| German measles |  |  | 7 |  | 3 | 62 |  | 8 | 14 | 52 | 146 |
| Influenza |  |  | 9 |  |  | 5 |  |  |  |  | 14 |
| Measles | 2 |  | 13 |  | 255 | 1,198 | 40 | 22 | 15 | 52 | 1,597 |
| Meningitis, meningococcal |  |  |  |  |  | 1 | 1 |  |  | 1 | 3 |
| Mumps | 1 |  | 26 |  | 120 | 343 | 51 | 89 | 259 | 187 | 1,076 |
| Poliomyelitis |  |  |  |  |  |  | 3 | 4 |  | 1 | 8 |
| Scarlet fever | 3 |  | 2 | 5 | 85 | 38 | 22 | 23 | 82 | 51 | 311 |
| Tuberculosis (all forms) | 12 |  | 5 | 21 | 98 | 34 | 22 | 9 | 7 | 21 | 229 |
| Typhoid and paratyphoid fever |  |  |  |  | 8 | 1 |  | 1 |  |  | 10 |
| Venereal diseases: |  |  |  |  |  |  |  |  |  |  |  |
| Gonorrhea | 7 |  | 9 | 8 | 55 | 50 | 25 | 17 |  | 63 | 234 |
| Syphilis | 4 |  | 11 | 4 | 41 | 15 | 9 | 13 |  | 9 | 106 |
| Primary |  |  | 2 | 1 | 2 | 2 |  | 3 |  | 1 | 11 |
| Secondary |  |  |  |  | 2 | 2 |  | 2 |  |  | 6 |
| Other syphilis | 4 |  | 9 | 3 | 37 | 11 | 9 | 8 |  | 8 | 89 |
| Whooping cough | 1 |  | 5 |  | 70 | 116 | 22 | 2 | 9 | 30 | 255 |

## JAMAICA

*Reported Cases of Certain Diseases—4 Weeks Ended Nov. 25, 1950*

| Disease | Kingston | Other localities | Total |
|---|---|---|---|
| Chickenpox |  | 7 | 7 |
| Diphtheria |  | 3 | 3 |
| Dysentery, unspecified |  | 2 | 2 |
| Erysipelas |  | 2 | 2 |
| Meningitis, meningococcal |  | 1 | 1 |
| Ophthalmia neonatorum |  | 1 | 1 |
| Tuberculosis, pulmonary | 24 | 45 | 69 |
| Typhoid fever | 7 | 76 | 83 |
| Typhus fever (murine) |  | 1 | 1 |

## JAPAN

*Influenza.* An outbreak of influenza has been reported in Southern Japan where more than 2,000 cases occurred during the 5-week period ended November 18, 1950. The estimated number of cases for the corresponding period in 1947, 1948, and 1949 were 222, 83, and 43, respectively. The number of cases for the whole of Japan during the epidemic last year did not exceed 2,000 for a period twice as long (Nov. 1949–Jan. 1950).

## MADAGASCAR

*Reported Cases of Certain Diseases and Deaths—October 1950*

| Disease | Aliens | | Natives | |
|---|---|---|---|---|
| | Cases | Deaths | Cases | Deaths |
| Beriberi |  |  | 4 |  |
| Bilharziasis | 6 |  | 89 |  |
| Dysentery: | | | | |
| Amebic | 9 |  | 165 | 11 |
| Bacillary |  |  | 18 |  |
| Erysipelas |  |  | 11 |  |
| Influenza | 12 |  | 6,748 | 40 |
| Leprosy |  |  | 118 |  |
| Malaria | 166 | 4 | 27,472 | 113 |
| Measles | 8 |  | 206 |  |
| Meningitis, meningococcal |  |  | 2 | 1 |
| Mumps |  |  | 71 |  |
| Plague |  |  | 20 | 19 |
| Pneumonia (all forms) | 4 | 3 | 1,210 | 118 |
| Puerperal infection |  |  | 4 |  |
| Tuberculosis, respiratory | 5 | 1 | 100 | 14 |
| Typhoid fever | 1 |  | 8 | 1 |
| Whooping cough | 3 |  | 307 | 3 |

## VENEZUELA

*Diphtheria.* During the period October 29–December 15, 1950, 91 cases of diphtheria were reported in the urban zone of Maracaibo. For the period October 29–December 2, 34 cases were reported in the rural zone of the city. The authorities reported that all recommended measures have been taken.

## REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

The following reports include only items of unusual incidence or of special interest and the occurrence of these diseases, except yellow fever, in localities which had not recently reported cases. All reports of yellow fever are published currently. A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

### Plague

*Belgian Congo.* One fatal case of bubonic plague was reported in Rukemba, north of Lubero in Costermansville Province.

### Smallpox

*Burma.* During the week ended December 9, 1950, three cases of smallpox were reported in Rangoon and one case in Moulmein.

*Dahomey.* During the period December 1–10, 1950, 10 cases of smallpox were reported in Dahomey. For the period November 21–30, 8 cases were reported.

*India.* For the week ended December 2, 1950, 98 cases of smallpox were reported in Nagpur as compared with 21 for the previous week. For the year through November 25, a total of 91 cases were reported.

*Tanganyika.* During the week ended October 28, 1950, 74 cases (14 deaths) of smallpox were reported in Tanganyika.

**Typhus Fever**

*Egypt.* During the week ended December 9, 1950, one case of typhus fever was reported in Alexandria.

*Turkey.* For the week ended December 9, 1950, six cases of typhus fever were reported in Turkey, one of which was in Istanbul.

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The printing of this publication has been approved by the Director of the Bureau of the Budget (August 10, 1949).

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It contains (1) current information regarding the incidence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

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# Public Health Reports

VOLUME 66 JANUARY 12, 1951 NUMBER 2

IN THIS ISSUE



FEDERAL SECURITY AGENCY

PUBLIC HEALTH SERVICE

**FEDERAL SECURITY AGENCY**
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***Leonard A. Scheele, Surgeon General***

**Division of Public Health Methods**
***G. St. J. Perrott, Chief of Division***

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# Public Health Reports

*Vol. 66* • JANUARY 12, 1951 • *No. 2*

## Experimental Study on the Use of Homonymous Transplants of Esophagus in Dogs

By H. L. Skinner, M.D., F.A.C.S.* James K. Conn, M.D.* and J. F. Oesterle, M.D.†

Resection of esophageal lesions has been a challenge to surgeons for more than 50 years. During that time, there have been numerous reports of successful resections. However, it has been only within the last decade that improvements in anesthesia and surgical techniques, along with the introduction of antibiotics, have permitted the achievement of acceptable mortality rates and end results. The diversity of proposed techniques indicates that an entirely satisfactory and standardized procedure has not yet been devised. A few of these may be mentioned. Resection with esophagogastrostomy is the usually accepted procedure and has been successfully performed for lesions as high as the cervical esophagus. However, the results of having a partial or complete thoracic stomach are not ideal, and a search has been under way continuously for an alternate method which can be used to reconstruct the esophageal continuity.

More and more successful attempts are being made to resect the lesion, whether carcinoma, benign tumor, or stricture, and to perform an esophago-esophageal anastomosis (*14, 15, 10, 3, 13, 12*). That the blood supply of the thoracic esophagus is much better than had been thought has now been amply demonstrated. Parker and Brockington (*10*) resected 5 7 cm. segments of esophagus in dogs and anastomosed the cut ends. Their results remained good even when the entire thoracic esophagus had been freed from its bed prior to the resection and anastomosis. Swenson and Clatworthy (*15*) obtained good results with esophago-esophageal anastomosis in dogs after resecting 16 to 80 percent of the esophagus. More recently, MacManus, Dameron, and Paine (*7*) have performed experimental studies showing that the blood supply of the esophagus in dogs is not jeopardized by freeing the entire thoracic esophagus as long as

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the cervical portion remains intact. Skinner and Lloyd (*12*) in their case report have shown that the entire esophagus can be mobilized with secondary resection and end-to-end anastomosis. Because of the inadequacy of certain aspects of all the procedures, various modifications have been proposed including a tubed pedicle skin graft to replace the esophagus (1), lung-pleura graft to protect the suture line (*2*), and pedicle lung flap to strengthen a weakened area of the esophagus (*9*).

In view of the above advances and the success in transplanting many of the body tissues, the question arose as to whether it would be possible to perform esophageal transplants. The problems involved were similar to those encountered in performing arterial grafts, so the methods used by Peirce, et. al. (*11*), and Gross, Bill and Peirce (*4*) for preserving arterial segments were adapted for our use in preserving esophageal grafts.

## Method

Homonymous transplants were performed in 20 dogs. No attempt was made to use any particular breed, but a uniform size of 20 to 30 pounds was maintained insofar as possible. A self-perpetuating system for supplying the grafts was established whereby a segment was removed from one animal, preserved for varying lengths of time, and transplanted into another animal which supplied the next graft. The size of the graft varied from 3 to 7 cm. in length. It was observed that these segments shrank following their resection to about 75 percent their size in situ. They did not change further in size during the period of preservation.

The preservative was that used in studies on aortic grants (*4*, *11*), 90 percent balanced salt solution and 10 percent serum. Balanced salt solution is prepared as a stock solution [1] and diluted five times prior to use. A buffer solution of 1.4 percent $NaHCO_3$ is prepared, stored separately, and added to the BSS in a ratio of 2.5 cc. to 100 cc. at the time of use. Equilibrium of the system is at pH 7.6.

The transplants were placed in the previously autoclaved solution as soon as they were removed from the animal; 100,000 units of penicillin and 1.0 gm. of streptomycin were added, and within 2 hours serum was added. The serum was obtained from blood taken from the azygos vein at the time of operation. The flasks were covered with layers of gauze and rubber sheeting and placed in an ordinary refrigerator until ready for use. We felt that addition of the antibiotics reduced the activity of normal esophageal flora and also minimized the risk from chance contamination. The majority of the transplants were preserved for 7 days. However, in five instances,

[1] Formula for stock solution BSS: $H_2O$ 250 cc.; NaCl 20 gm., KCl 1-0 gm., $MgCl_2$-6 $H_2O$ 0.2 gm., $CaCl_2$ 0.35 gm., $Na_2HPO_4$ 0.15 gm., $KH_2PO_4$ 0.15 gm., glucose 2.5 gm., 0.4 percent phenol red 12.5 cc., 1 cc. chloroform, 0.38 gm. $Na_2HPO_4$-12 $H_2O$ dissolved separately and added to solution.

the length of preservation was 1, 6, 8, 13, and 14 days, and two grafts were transplanted immediately without preservation.

Anesthesia was provided by a single I. V. injection of sodium pentobarbital in a dose of 1.0 gr. per 5 lbs. body weight. Artificial respiration was maintained by means of an automatic respirator,[2] with a continuous flow of oxygen, connected to an endotracheal tube. The surgery was carried out through a right postero-lateral incision. The pleural space was entered through the bed of the sixth rib, although, occasionally, the fifth was used with equal satisfaction. A Tuffier retractor provided excellent exposure through this incision. The collapsed right lung was packed anteriorly with moist sponges. The mediastinal pleura was incised over the segment of esophagus to be resected from the azygos vein for a distance of approximately 10 cm. distally. An attempt was made to preserve intact flaps of mediastinal pleura to facilitate subsequent closure. The above portion of esophagus was then freed from its bed, the few vessels entering it being ligated and divided as close to the wall as possible. Care was exercised in handling the esophagus to avoid crushing or otherwise injuring the wall. Traction sutures were placed in the wall about 10 cm. apart and the intervening segment, varying from 5 to 8 cm. in length, was excised. The transplant was then placed in the defect and proximal and distal anastomoses performed.

Anastomosis was in two layers, the mucosa being approximated with simple interrupted sutures of No. 0000 chromic intestinal catgut and the muscle, with simple interrupted sutures of No. 000 intestinal cotton. As few sutures as possible were used, approximately 8 to 12 being placed in each layer. No attempt was made to produce a water-tight closure, and no signs of leakage at the suture lines were noted. The mediastinal pleura was closed, the lung reexpanded, and the chest wall closed in layers without drainage. We found this simple method of anastomosis to be most satisfactory. Methods employing continuous suture, or those producing inversion or eversion of the edges, tended to cause stenosis at the suture line.

Postoperatively, the animals received 1 injection of 300,000 units of repository penicillin. For 48 hours they were given nothing by mouth but received hypodermoclysis of 250 cc. of 5 percent glucose in saline daily. On the third day they were given 250 cc. of milk and water twice. Following this, Pablum and strained and chopped foods were added to the diet as tolerated.

## Results

Of 20 dogs operated upon, 11 survived longer than 1 week. Of the 9 that died, 5 deaths were due to necrosis of the grafts with disruption of 1 of the suture lines. The four remaining deaths, while not due to

[2] Rand respirator.

necrosis of the transplant, occurred because of the operative procedure and are included for the sake of completeness. One death was attributed to empyema which followed massive soiling of the pleural space by regurgitated gastric contents while the esophagus was open. Another was due to massive hemorrhagic pleural effusion. A third failed to resume normal respirations when the respirator was discontinued, and the last one died of cardiac arrest while the esophagus was being dissected free. One other developed cardiac arrhythmia and cessation of beat during the procedure but responded to application of 1 percent procaine to the region of the pacemaker and to cardiac massage. Three microscopic examinations of the tissues were made of (1) the fresh specimen prior to preservation, (2) the preserved transplant, and (3) the specimen at the time the animal was sacrificed.

| | |
|---|---|
| Total grafts performed | 20 |
| Surviving more than 1 week | 11 |
| Grafts sloughed | 5 |
| Other deaths | 4 |
| Gastric spillage with massive pleural infection | 1 |
| Anesthetic death | 1 |
| Cardiac arrest | 1 |
| Massive pleural effusion | 1 |

The animals were sacrificed when it became impossible to maintain satisfactory nutrition by the oral route. No attempt was made to prolong life by parenteral feedings.

The dogs that survived the immediate postoperative period followed a characteristic course and exhibited similar end results. They were uniformly active and took fluids well for 1 to 2 weeks. The majority of the animals tolerated strained foods well during the second week but occasionally vomited. The process of stenosis began about the third week and became progressively more severe until practically anything taken by mouth was regurgitated. As stenosis became complete, even accumulations of saliva were vomited from time to time. The speed with which stenosis progressed varied from animal to animal and is thought to represent merely individual tissue variation. Only one animal had hematemesis, and this was transient.

At autopsy, the grafted area was found to be densely attached to the surrounding structures by appreciable vascular adhesions. The anastomotic lines were firmly healed. The graft was thickened and very firm and was generally contracted toward the center. The lumina varied from 1–2 mm. to 0.5 cm. in diameter. When the specimen was opened longitudinally, a small area of stenosis was seen at the center of the graft. Fresh mucosa had grown in toward the middle from the ends. This picture was found irrespective of whether the graft was transplanted in the fresh state or had been preserved for a period of time up to 14 days.

*Results of homonymous grafts performed on dogs*

| Dog | Weight | Date | Graft from | Size graft (cm.) | Length of preservation (days) | Course | Survival (days) | Result |
|---|---|---|---|---|---|---|---|---|
| B | 18 | 12/22/49 | A | 3 | 7 | Fluids and soft foods first 2 weeks. Occasional emesis third week. Never any solid food. Constant emesis by fifth week. | 50 | Sacrificed, weight 10 pounds. Almost complete stenosis at distal anastomosis. |
| C | 22 | 12/29/49 | B | 3 | 7 | Extensive spillage of gastric contents at operation. | 7 | Pneumonic consolidation on right. Proximal suture line sloughed. Graft partially necrotic. |
| D | 22 | 1/5/50 | C | 3 | 7 | At operation graft appeared poorly preserved. Was placed in BSS while hot. | 2 | Graft necrotic. |
| E | 20 | 2/12/50 | D | 3 | 7 | First week active and well. Took liquids. Second week took strained foods but vomited chopped foods. Third week tolerated only liquids and showed hematemesis. | 27 | Sacrificed, weight 14 pounds. Graft thick and generally constricted with stenosis at center. |
| F | 14 | 1/19/50 | E | 3 | 7 | Active and well. Took liquids and strained foods for 2 weeks. Failed sharply third week. Vomited saliva and all oral intake. | 22 | Sacrificed, weight 10 pounds. Complete stenosis with contraction in all dimensions. |
| G | 24 | 1/26/50 | F | 5 | 7 | Failed to react from anesthesia, possibly because of obstruction of trachea by mucous. | ------ | |
| H | 20 | 2/3/50 | G | 5 | 8 | Did well for 2 weeks. Took milk and ground food. No emesis until third week. | 23 | Stricture at center graft. Dog died. Weight 18 pounds. |
| I* | 20 | 2/10/50 | -- | -- | -- | -------- | -------- | |
| J | 22 | 2/16/50 | H | 5 | 13 | Died after 12 hours. At necropsy there was a massive hemorrhage pleural effusion. Neither lung was aerated. Graft was intact. | | |
| K | 18 | 2/17/50 | I | 5 | 7 | Died on third day | 3 | Graft necrotic. Suture line sloughed. |
| L | 16 | 3/2/50 | J | 4 | 14 | Usual course of progressive improvement for 2 weeks followed by increasing stenosis. | 18 | Sacrificed, weight 10 pounds. Complete stenosis. |
| M | 28 | 3/3/50 | L | 4 | 1 | Same | 17 | Sacrificed, weight 20 pounds. Complete stenosis. |
| N | 28 | 3/9/50 | M | 4 | 6 | Normal postoperative course until the fifth day when febrile reaction set in. | 6 | Pneumonia on right. Necrosis of graft with partial slough. |
| S | ------ | 4/13/50 | N | 4 | 7 | Poor course | 4 | Died. Graft necrotic. |
| U | ------ | 4/27/50 | V | 4 | (1) | Normal course. Dilated bid but these not as satisfactory as in previous cases. Showed symptoms of progressive stenosis. | 21 | Sacrificed. Almost complete stenosis. |
| V | -------- | 4/27/50 | U | 4 | (1) | do | 28 | Do. |

*No graft performed. Animal died in cardiac arrest while esophagus was being exposed.
[1] None, immediate transplant.

Figure 1. Typical graft when not dilated. This specimen is 27 days postoperative. Note the complete stenosis at the center of the graft.

Figure 2. Homonymous graft 40 days postoperative. Stenosis minimal, mucosa is reepithelialized. Proximal suture line was inadvertently cut in removing specimen.

Figure 3. Portion of normal esophageal wall showing mucosa, submucosa, one muscle layer, and mucous glands which are abundant in dogs

Figure 4. Portion of wall of graft showing replacement of all elements by fibrous tissue. Note that fresh mucosa is present in this portion of graft.

Microscopically,[3] the tissue after preservation exhibited histological integrity. There was minimal evidence of edema and hydrops and some change in staining characteristics of the glands. The gross impression of the autopsy specimen was confirmed by microscopic examination. There was new mucosa at the ends of the graft with an ulcerated central area The wall was degenerated with fibroblastic replacement of much of the muscle, although some smooth muscle bundles were intact.

Because of these findings, we felt that patency of the drafts might be preserved by repeated dilitation. This process was tried on five dogs, O, Q, R, U, and V. A No. 24 esophageal dilator was used, but mechanical difficulties permitted satisfactory dilitations only in dog R. The dilator used was not large enough for complete dilitation and was not rigid enough to withstand constant use Passage of the dilator did not appear to cause the animal any particular discomfort. No anesthesia was required, and the only untoward effect noted was a gagging reaction. We found that, to be effective, dilitations should be instituted on the 7th postoperative day and should be done twice daily Each dilitation resulted in markedly improved function for 6 to 8 hours. Dilitations could not be performed with complete satisfaction in dogs O, Q, U and V and stenosis developed progressively. However, they exhibited a better course than those which were not dilated in that there was less vomiting and nutrition was better maintained. The dilitations were completely satisfactory in dog R This animal tolerated kennel rations in small and frequent feedings. A barium swallow, performed on the 23d day, showed some stenosis with proximal dilitation. Death which occurred on the 40th day was due to distemper. The autopsy specimen presented an entirely different picture than the others. The wall of the graft was thin and pliable, the lumen being only slightly reduced in size. No stenotic area was present. The surface was completely reepithelialized. Microscopically, this specimen showed essentially the same changes as the others except that the mucosa was completely regenerated and there was less cellular infiltration.

A few conclusions can be drawn from this limited preliminary study. Esophageal tissue will remain viable when refrigerated for a period as long as 14 days in a mixture of 90 percent balanced salt solution, 10 percent serum, streptomycin, and penicillin This tissue apparently remains alive when transplanted to another animal of the same species. Revascularization seems to take place slowly from the esophageal bed and surrounding tissues. In the meantime, degeneration of the muscular elements, glands, and mucosa is possibly caused by ischemia, and replacement of fibrous tissue takes place with its resultant

[3] Histological specimens reviewed by Lawrence H. Sophian, Medical Director, Public Health Service, Chief of Pathology, U. S. Marine Hospital, Staten Island, N. Y

contraction and stenosis of the lumen. We believe that an inference can be drawn from this work, namely, that a functional graft can be obtained if patency is maintained until the scarring process ceases. If such an inference proves to be correct, then further studies are in order to determine the maximum amount of esophagus which can be removed and replaced by a graft.

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# Dried Smallpox Vaccine

By J. W. Hornibrook, M.D. and W. H. Gebhard, B.S.[1]

The advantages of a stable smallpox vaccine are easily apparent. With such a product, effective vaccination would be possible even in places without adequate refrigeration. Storage and shipment would be simplified, and the cost of recalling and replacing outdated material would be reduced.

In 1927, Otten (*1*) reviewed the history of dried vaccine production and reported on its successful use in Batavia. He emphasized the importance of sealing the vaccine under a high vacuum. The results of 16,000 vaccinations performed with dried vaccine derived from buffalo source were summarized by Otten in 1932–33 (*2*). This vaccine remained stable for days at 58° C., for months at 37° to 42° C., and for a year at average room temperature in the tropics. In 1913, Morozov et al. (*3*) reported on a dried vaccine which was still considered potent at a 1/1000 dilution after storage for 30 to 35 days at 37° C. In 1949, Nagano (*4*) reported on the use of dried vaccine which compared favorably with a liquid vaccine when tested in persons.

Three major difficulties have been encountered in the preparation and use of dried smallpox vaccine, and these probably account for its not being more widely used. First, it has been difficult to obtain preparations in which the numbers of contaminating bacteria have been reduced to an acceptable level. Second, it is more difficult to reconstitute a dried vaccine at the time of use than to open a capillary of liquid vaccine. Third, it is more expensive to produce dried vaccine than it is to produce the liquid product.

The study described in this report was undertaken to investigate ways of reducing or eliminating the disadvantages of dried preparations. In addition, it was thought worth while to investigate the drying of calf vaccine. Otten used a vaccine derived from buffalo.

## Method

A laboratory, licensed for smallpox vaccine production by the National Institutes of Health, prepared the calf-derived vaccine pulp, lot. No. 690, following the method described by Ducor (*5*). After a sample was taken for bacterial count determinations and

[1]Laboratory of Biologics Control, Microbiological Institute, National Institutes of Health, Public Health Service; and Division of Laboratories, Michigan Department of Health, respectively.

safety tests, the pulp was suspended in a lactose salt mixture (*6*),[1] a weight volume ratio of one part pulp to three parts menstruum.

The pulp was ground in a Waring Blendor for 50 minutes. To prevent overheating the mixture, the total grinding time was divided into five 10-minute operations, and the mixture was refrigerated at 4°–6° C. until cold after each operation. An aqueous solution of crystaline penicillin G was added to the pulp suspension to make a concentration of 10 units per ml. at the conclusion of the fourth grinding period.

Using a capillary pipette, 0.5 ml. amounts of the pulp suspension were dispensed into sterile, cotton-plugged, pyrex tubes 8 by 110 mm. The inner walls above the vaccine level in the tubes were cleaned with sterile cotton swabs to prevent charring of residual vaccine during subsequent flame sealing.

To facilitate individual vaccination, the vaccine was made to adhere to the vaccination needle by the following method: steel vaccine needles, roughened with an emery wheel for a distance of one-fourth inch from the tip of the needle were dipped in 10-percent human albumin solution and allowed to dry at room temperature. Half-hitches of No. 25 linen thread were cast on to the roughened surface to form a linen surface approximately one-fourth inch in length. Each needle was then placed in a 7 by 95 mm. soft-glass tube that had previously been constricted in the middle to a diameter of about 3 mm. The tubes were plugged with nonabsorbent cotton and autoclaved for 20 minutes at 20 pounds steam pressure to sterilize the needles and to fix the thread firmly onto the needle by coagulating the albumin. When the tubes had cooled, one drop of vaccine was introduced by capillary pipette into each tube, the tube being manipulated so that the vaccine was brought into contact with the linen surface of the needle.

The method described for the preparation of vaccine-impregnated needles might be economically adapted to routine procedures if small, thin-walled vials were used and an automatic thread wrapping machine can be devised, or if other absorptive materials similarly located on the needle are used.

Two drying methods were used:

1. After freezing the vaccine at –18° C., the cotton plugs were removed from some of the tubes. They were then attached to the manifold of a sulfuric acid drying apparatus (*7*) which was then evacuated to a pressure of 50 microns of mercury. After 20 hours, the

[1] This mixture had the following composition: potassium citrate ($K_3C_6H_5O_7 \cdot H_2O$) 1.35 gm., sodium citrate ($Na_3C_6H_5O_7 \cdot 2H_2O$) 2.15 gm., potassium phosphate ($K_2HPO_4$) 0.61 gm., calcium chloride ($CaCl_2$ anhydrous) 1.33 gm., magnesium chloride ($MgCl_2 \cdot 6H_2O$) 0.6 gm., potassium carbonate ($K_2CO_3 \cdot 1\frac{1}{2} H_2O$) 1.0 gm., lactose 57.5 gm., lactic acid q. s. to pH 7.00 (about 0.65 cc.), $H_2O$ 1,000 cc. Dissolve all ingredients except $CaCl_2$ in 500 cc water. Dissolve $CaCl_2$ in 500 cc. water. Mix the two solutions and adjust pH. Filter through a Berkfeld filter.

tubes were sealed at the constriction while still attached to the manifold under a maximum pressure of 50 microns of mercury.

2. The remainder of the tubes, plugged with cotton, were placed in 500 cc. bottles and attached to a 1-liter glass condenser. The latter was immersed in an insulated container of dry ice (solid $CO_2$) and alcohol. Connecting tubes between the condenser and bottles were at no place less than one-half inch in diameter. The pressure was then reduced to 50 microns of mercury. After 48 hours, the tubes of vaccine were removed, attached to a manifold, and sealed under a pressure of 50 microns.

## Results

### *Bacterial Counts*

The National Institutes of Health mininum requirements for smallpox vaccine state that the bacterial count on the final vaccine shall not exceed 1,000 organisms per ml. Determinations on the frozen pulp, sampled before it was suspended in the lactose salt menstruum, gave an average of 14,000 organisms per gram of pulp. After dilution with the lactose salt solution, addition of penicillin, and drying, the count of the reconstituted vaccine dropped to an average of 600 organisms per ml., well below the maximum number allowed.

### *Potency Tests*

1. Vaccines prepared by drying methods 1 and 2 gave essentially similar results:

> Method 1—80 percent confluency at the 1:1,000 level, and 7 vesicles at the 1:10,000 level.
>
> Method 2—50 percent confluency at the 1:1,000 level, and 9 vesicles at the 1:10.000 level.

This vaccine, when stored at 37° C. for 43 days, gave 7 pocks at 1:1,000 and 3 pocks at 1:3,000. After 113 days at 37°, we obtained confluency at a 1/10 dilution, 13 pocks at 1/100, and 7 pocks at 1/1000.

Another lot of dried vaccine from the same source and of relatively the same potency gave a 50 percent confluent reaction at 1.100 after being held at 37° C. for 80 days. The above potency testing was done by the method described in the Smallpox Minimum Requirements of the National Institutes of Health. The vaccines were all reconstituted to original volume before diluting.

2. The individually wrapped vaccine needles were tested on rabbits by rotating the vaccine-saturated thread consecutively in drops of water placed on five sites on the rabbit. The needle was then used by the multiple puncture method to vaccinate in these five places. Vaccinial vesicles were obtained in the first four sites in one instance and in all five in another.

3. Twelve individuals were vaccinated with the dried vaccine reconstituted to original volume in distilled water. This vaccine had been stored at 4°–6° C. Of four previously vaccinated persons three had accelerated reactions and one an immune reaction. Four persons not previously vaccinated had primary reactions. Of four persons with questionable histories of vaccination, one had a primary reaction, one an accelerated reaction, and two had immune reactions.

Five individuals who had been previously vaccinated were vaccinated with the dried vaccine reconstituted to four times the original volume in 0.5 percent phenol after storage for 43 days at 37° C. Only 10 insertions were made per person. In this group there were three immune reactions, one accelerated reaction, and one negative reaction.

4. A tube of vaccine, reconstituted to the original volume with 0.5 percent phenol and stored 24 hours at 4°–6° C., gave 100 percent confluency at a dilution of 1:100 and 80 percent confluency at a dilution of 1:1000 when titrated. The same material stored 24 hours at room temperature (26.6° C.) gave 90 percent confluency at 1:100 and 3 vesicles at 1:1000. This decrease in potency after standing makes it advisable to use the vaccine on the day of reconstitution.

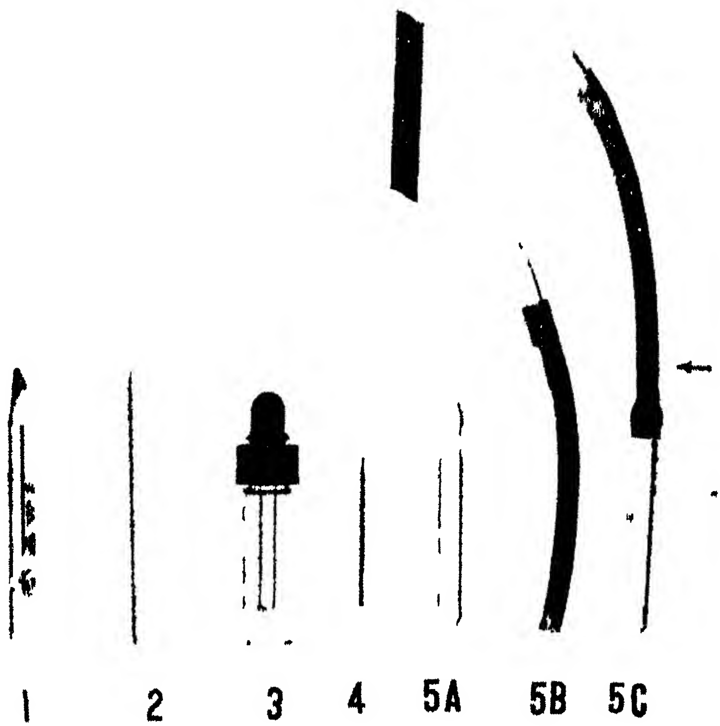
## Methods of Reconstitution of Dried Vaccine

A major problem in the use of a dried vaccine is a convenient and safe method of reconstitution and administration. A definite hazard is involved in opening the vials of vaccine because there is a tendency for a small amount of the powdered pulp to be blown from the evacuated tube when it is broken. This pulp could cause an ocular or respiratory infection, or a deep vaccinia infection might be produced from accidental cuts on broken glass.

Several methods have been devised to overcome these difficulties. For individual vaccination, the arrangement shown by No. 1 in the illustration can be used. The ampoule is scratched with the file, wrapped with the sterile gauze, and broken. A drop of 0.5 percent phenol in water is placed on the site of vaccination by means of the dropping bottle (No. 3). The linen wrapped portion of the needle is then rotated in the drop of diluent, and the patient is vaccinated through this drop by means of the needle point.

When several persons are to be vaccinated at one time, the vial containing the vaccine pellet (No. 2) can be scratched with the file, wrapped with gauze, and broken. The pellet of vaccine can then be dropped into the bottle (No. 3) which contains 0.5 percent phenol. The cap is replaced and the bottle shaken to suspend the vaccine.

Perhaps the safest method is that shown in Nos. 5A–C. A thin-walled rubber tube sealed at one end and containing 0.6 ml. of 0.5 percent phenol is slipped over the neck of the ampoule. When the tip of



Methods for reconstituting and administering dried vaccine.

the ampoule is broken by bending at the arrow (No. 5C), the vacuum causes the solution to enter the vial and reconstitute the vaccine. The vaccine may then be removed by dipping a wooden applicator into the solution and applying it to the skin. Vaccination is then done in the usual way with the needle.

## Summary


1. Smallpox vaccine prepared from calves can be dried with only slight loss of potency. Simple equipment will serve in the drying process.

2. If penicillin is added to a carefully prepared vaccine before drying, the minimum requirements as to bacterial count can be satisfied.

3. Several methods for packaging and reconstituting the dried vaccine in convenient form are described.

4. The hazards of reconstituting dried vaccine are discussed.

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# Inhibition of a Strain of *Brucella abortus* By Medium Filtered Through Cotton

By Donald M. Boyd and Ezra P. Casman *

The study of cotton as a possible source of factors inhibitory for the growth of *Brucella abortus* was suggested by observations made at the Department of Agriculture's Animal Disease Station at Beltsville, Md. It was noted there that a potato-infusion agar medium clarified by centrifugation gave excellent growth of *Br. abortus*, whereas the same medium filtered through cotton was inferior in supporting growth of the organism.

In order to determine the nature of the inhibition resulting from filtration through cotton, the effect of this procedure on the growth of a fastidious strain of *Br. abortus* on a simple and reproducible medium was studied.

## Materials and Methods

The test organism employed in the experiments described below was strain No. 2451, isolated July 1947 from the milk of an infected cow at the Animal Disease Station of Beltsville, Md. It required at least 5 days of incubation in an atmosphere of 10 percent carbon dioxide for the development of appreciable growth on solid media.

In preliminary experiments it was found that tryptose agar (Bacto) was incapable of supporting growth when inoculated with very dilute suspensions of the test organism. Since this deficiency could be removed by adding starch to the medium, the removal of fatty acids seemed advisable in view of the work of Ley and Mueller (*1*). Removal of fatty acids by extracting acidified tryptose (Bacto) with ether and by washing the agar with large amounts of alkaline (pH 9.0) distilled water, using the technique of Casman (*2*), rendered the medium capable of supporting growth of the test organism. Since these purification procedures were time consuming and gave variable results, a simpler and more satisfactory solution to the problem was obtained by modifying the medium through addition of the minimal amount of starch (0.03 percent) necessary for the neutralization of the fatty-acid effect. The basic medium was prepared according to the following formula:

| | *Grams* |
|---|---|
| Agar (Bacto) | 15 |
| Tryptose (Bacto) | 20 |
| NaCl | 5 |
| Dextrose | 1 |
| Corn starch | 0.3 |

Cold distilled water to make one liter; pH 6.8.

* Food and Drug Administration, Federal Security Agency.

The mixture was shaken while cool to disperse the starch and heated to boiling. After autoclaving at 121° C. for 15 minutes, it was cooled and distributed in sterile Petri dishes provided with porcelain tops, the outsides of which were glazed.

The plates were streaked uniformly with very light saline suspensions (approximately 100,000 organisms per ml.) of the *Brucella* culture. A one mm. loopful of the suspension was placed at the edge of the medium and the inoculum was spread by streaking with the same loop in such a manner as to permit determination of the ability of the medium to support the growth of both isolated and large concentrations of organisms. The plates were incubated at 37° C. under 10 percent carbon dioxide, and examined at intervals between the 3d and 10th days for distribution and amount of growth. Duplicate plates were streaked, and inhibition was determined by comparison with control plates. Inhibition varied in degree from decrease in the size of the isolated colonies, through absence of discrete growth, and, finally, complete absence of growth in both lightly and heavily inoculated portions of the plates.

## Results

The effect of filtration of the basic medium through each of 15 different commercial brands of absorbent cotton was first studied. One-hundred-ml. quantities of the hot medium were filtered through 10-gram portions of the cotton samples and the filtrates were compared with a portion of the medium which was not filtered. Although the latter supported good growth of the test organism, all 15 of the filtered portions showed no growth after 7 days of incubation.

An attempt was next made to determine whether filtration through cotton removed an essential ingredient from the medium or resulted in the addition of a growth-inhibiting substance. Five hundred ml. of the basic medium were filtered while hot through 10 grams of absorbent cotton. A second 500-ml. portion was prepared with distilled water which had been filtered while hot through another 10-gram portion of the cotton and a third portion of the basic medium was prepared without any filtration of the medium or its water. Growth on the control unfiltered medium became visible to the naked eye on the 4th day of incubation and was excellent on the 10th day. The first and second media were unable to support the growth of the test organism.

Having found that the cotton was the source of a growth-inhibiting substance, experiments were conducted to determine the amount and nature of this material.

When 200 ml. of the hot basic medium were filtered through 8.5 grams of absorbent cotton and diluted serially with unfiltered medium,

complete inhibition of growth was obtained in the 1:4 dilution and partial inhibition in the 1:8 dilution (table 1).

Table 1.—*Growth of Br. abortus No. 2151 on cotton-filtered medium diluted with unfiltered medium*

| Incubation (*days*) | Dilutions | | | | | Control |
|---|---|---|---|---|---|---|
| | 1:2 | 1:4 | 1:8 | 1:16 | 1:32 | |
| 3 | 0 | 0 | 0 | 0 | ± | ± |
| 4 | 0 | 0 | ± | ± | 1 | 1 |
| 5 | 0 | 0 | ± | 1 | 1.5 | 1.5 |
| 6 | 0 | 0 | 1 | 2 | 2 | 2 |
| 10 | 0 | 0 | 2 | 3.5 | 4 | 4 |

Key: 0=none, ± = trace, 1=distinct; 2=moderate; 3=good, 4=excellent.

Since the inhibitory agent contributed by filtration through cotton could be neutralized by increasing the starch content of the medium to 0.1 percent, and since the cotton was found by Soxhlet extraction to contain from 0.4 to 0.6 percent ether-soluble material, inhibition by fatty acids was again indicated.

The fatty-acid content of a hot-water extract of cotton was removed by ether extraction, and the ether extract and ether-extracted water were examined for inhibitory activity according to the following technique: Ten grams of cotton were extracted with 500 ml. of hot distilled water, the extract adjusted to pH 2.0 with tenth-normal HCl and extracted three times in a separatory funnel using two volumes of ether for each extraction. The dried ether extract weighed 12 mg., representing 0.12 percent of the weight of the cotton. The extract was added to the basic unfiltered medium prior to autoclaving to give various concentrations. Complete inhibition of growth was obtained with a 1-mg. percent concentration (10 mg. per liter). When the ether-extracted water was readjusted to pH 7.0 with tenth-normal NaOH and used in preparing the basic medium, growth was as good as that on the control basic medium (see fig. 1).

The mean molecular weight of the fatty acids removed from cotton was determined by the following method: One kilogram of absorbent cotton was extracted with approximately 5 liters of boiling water and the extract was concentrated to 500 ml. by boiling. The neutral fats were removed by adjusting the concentrate to pH 12 with N/10 NaOH in the cold, adding an excess (2 ml.) of N/1 NaOH and extracting three times, using two volumes of ether for each extraction.[1] The extracted water was then adjusted to pH 2.0 with N/10 HCl, and the free fatty acids were removed by extracting three times

[1] This procedure permitted the conversion of free fatty acids to their soaps, without saponifying the neutral oils.

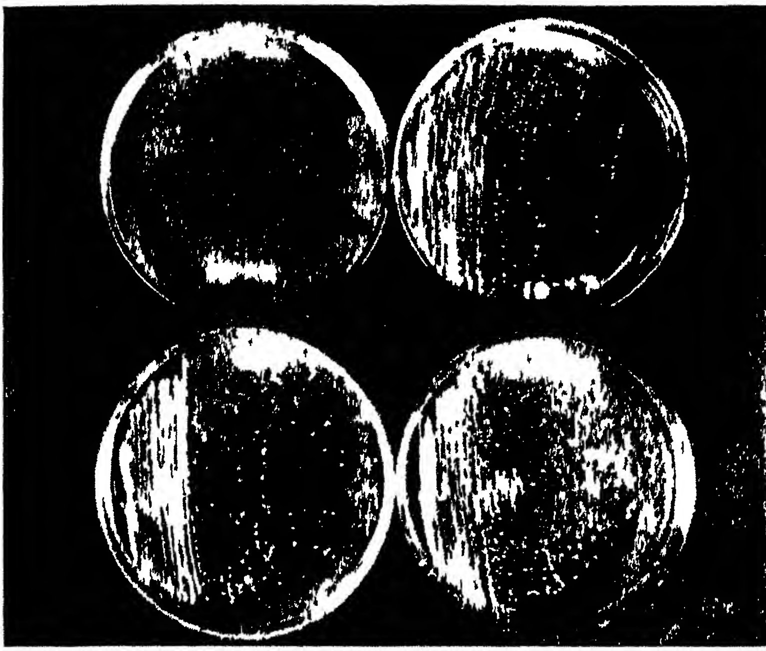

**Figure 1.** Effect of ether extract of hot-water filtrate of cotton in $10^{-1}$ and 10 concentrations compared with medium prepared with the extracted water.

using two volumes of ether for each extraction. The dried ether extracts were weighed, and titrated with N/10 NaOH, using phenolphthalein as an indicator. The mean molecular weight of the fatty acid extract was computed as 252.

Finally, the effect of adding to the basic medium the four principal fatty acids found in cottonseed oil was determined. Ethanol solutions of oleic, linoleic, palmitic, and stearic acids were added to the medium prior to autoclaving to give concentrations of 10, 1.0, and 0.1 mg. per liter. A control portion of the medium received the ethanol alone. The results obtained after 5 days of incubation are presented in table 2, and figure 2. Complete inhibition of growth was obtained with oleic and linoleic acids at concentrations of 10 and 1.0 mg. per liter and definite though incomplete inhibition with 0.1 mg. per liter. The saturated fatty acids gave incomplete but definite inhibition at concentrations of 10 and 1.0 mg. per liter. Inhibition by the above concentrations of fatty acids was not evident in the presence of 0.1 percent corn starch.

## Discussion

In addition to demonstrating the role of fatty acids in inhibition resulting from filtration of media through cotton, the present studies


Figure 2. Effect of oleic, linoleic, palmitic, and stearic acids in concentration of 1 mg./liter, on *Br. abortus*, strain 2151.

Table 2. *Inhibition of* Br abortus No *2151 by principal fatty acids of cottonseed oil*

| Fatty acid | Mg./Liter | | |
|---|---|---|---|
| | 10 | 1.0 | 0.1 |
| Oleic | 0 | 0 | 1 |
| Linoleic | 0 | 0 | 1 |
| Palmitic | 1 | 1.5 | 3 |
| Stearic | 1 | 2 | 3.5 |

Incubation time— 5 days.
Control —excellent (4) growth.

add *Br abortus* to the growing list of organisms that may be susceptible to fatty-acid inhibition.

The widespread use of cotton for clarifying media, the possibility of transferring inhibitory lipids from cotton plugs to glassware during sterilization with dry heat, as shown by Wright (*3*) and by Drea (*4*), and the presence in agar, according to Gould and Mueller (*5*), and in peptone of substances whose inhibitory properties may be neutralized by starch, indicate the advisability of adding starch to media used for the isolation of fastidious organisms. Such a procedure would

appear to be preferable to complete removal of fatty acids from media in view of the lipid requirements of certain organisms as shown by Dubos and Davis (*6*) and by Pollock (*7*).

## Summary and Conclusions

Filtration of an improved tryptose agar through 15 different commercial brands of absorbent cotton resulted in media which completely inhibited the growth of a strain of *Br. abortus*. The inhibition was due to substances extractable from cotton, which were soluble in hot water and soluble in ether after acidification with hydrochloric acid to pH 2.0. These fatty-acid-like substances completely inhibited growth of the test organism when added to the medium in the concentration of 10 mg. per liter. The unsaturated fatty acids which are found in cottonseed oil inhibited growth of the *Brucella* culture in a concentration of 1 mg. per liter; the saturated fatty acids gave partial inhibition at this concentration. The inhibition of growth could be neutralized by the addition of starch to the medium.

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## Training Course in Rat-Borne Disease

The twelfth semiannual field training course in rat-borne disease prevention and control will be held by the Communicable Disease Center, Public Health Service, in Atlanta, March 12–30, 1951.

The course is designed for rat control specialists including personnel of large city and county health departments, State health departments, and the Public Health Service. Military personnel are welcome to attend these courses.

"Rat-Borne Disease Prevention and Control," a new Communicable Disease Center manual, is the basic handbook for the course. The more complex considerations in this manual will be visualized for the first time by the new joint Army-Public Health Service series of motion pictures on rat control.

There will be increased emphasis on: (1) Surveys of towns for rodent infestation and recommendations for a suitable control program; (2) organization of local programs; (3) individual contacts in the promotion of anti-rat sanitation programs; (4) training of subordinate personnel; and (5) development of improved presentation by technical personnel of programs to lay audiences.

Following the 3-week training period in rat-borne disease, the Center will give a 2-week concentrated field training course in the control of flies, mosquitoes, and other insect vectors of disease. Personnel interested in both rat and insect control may attend both courses. The dates for this course are April 2–13, 1951.

Environmental sanitation is stressed as one of the most important methods of both rat and insect control.

Applications for the courses may be sent to the Medical Officer in Charge, Communicable Disease Center, 50 Seventh Street NE., Atlanta, Ga., Attention: Chief, Training Services.

# Incidence of Disease

*No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring*

## UNITED STATES

### Reports from States for Week Ended December 23, 1950

*Measles.* The number of cases of measles for the current week was 2,827 as compared with 2,008 for the same week last year. The total number reported since the seasonal low week is 24,588 as compared with 16,352 for the same period last year, and 45,079 in 1948. The only geographic divisions in which measles is now being reported in significantly greater numbers than for the 5-year (1945–49) median are the East North Central, West North Central, and West South Central States.

*Other diseases.* Influenza continues to be reported most frequently in a few States, namely in Texas (2,029 cases for the current week), Virginia (290), Arizona (214), and Arkansas (171). Ninety-five cases were reported in Hawaii where laboratory examination showed antibody rise for type A influenza virus in September and October. A 32-percent decrease in number of poliomyelitis cases from the previous week (368) was reported for the current week (251). The total

*Comparative Data For Cases of Specified Reportable Diseases: United States*

[Numbers after diseases are International List numbers, 1948 revision]

| Disease | Total for week ended Dec. 23, 1950 | Total for week ended Dec. 24, 1949 | 5-year median 1945–49 | Seasonal low week | Cumulative total since seasonal low week 1949–50 | Cumulative total since seasonal low week 1948–49 | 5-year median 1944–45 through 1948–49 | Cumulative total for calendar year 1950 | Cumulative total for calendar year 1949 | 5-year median 1945–49 |
|---|---|---|---|---|---|---|---|---|---|---|
| Anthrax (062) | 1 | 1 | (1) | (1) | (1) | (1) | (1) | 15 | 52 | (1) |
| Diphtheria (055) | 94 | 118 | 200 | 27th | 2,794 | 4,100 | 5,970 | 5,922 | 7,868 | 12,267 |
| Acute infectious encephalitis (082) | 11 | 12 | 7 | (1) | (1) | (1) | (1) | 991 | 750 | 615 |
| Influenza (480–483) | 3,161 | 2,289 | 3,338 | 30th | 31,775 | 27,910 | 32,861 | 281,031 | 103,777 | 220,512 |
| Measles (085) | 2,827 | 2,008 | 2,696 | 35th | 24,588 | 16,352 | 23,101 | 312,759 | 601,870 | 596,866 |
| Meningococcal meningitis (057.0) | 61 | 57 | 55 | 37th | 883 | 811 | 811 | 3,682 | 3,360 | 3,362 |
| Pneumonia (490–493) | 1,085 | 1,115 | | (1) | (1) | (1) | (1) | [2] 78,629 | 75,987 | -- |
| Acute poliomyelitis (080) | 251 | 151 | 138 | 11th | 31,961 | 11,258 | 24,631 | 33,092 | 42,171 | 25,098 |
| Rocky Mountain spotted fever (104) | 1 | - | 1 | (1) | (1) | (1) | (1) | 458 | 560 | 500 |
| Scarlet fever (050) | 1,215 | 1,083 | 1,697 | 32d | 14,202 | 15,225 | 20,631 | 54,372 | 72,891 | 81,632 |
| Smallpox (084) | --- | - | 1 | 35th | 8 | 7 | 21 | 34 | 48 | 108 |
| Tularemia (059) | 24 | 32 | 32 | (1) | (1) | (1) | (1) | 878 | 1,106 | 1,106 |
| Typhoid and paratyphoid fever (040, 041) [3] | 43 | 59 | 41 | 11th | 2,887 | 3,311 | 3,304 | 3,396 | 3,832 | 3,849 |
| Whooping cough (056) | 1,384 | 1,394 | 1,530 | 39th | [4] 20,215 | 20,066 | 22,690 | [4] 117,410 | 66,668 | 98,565 |

[1] Not computed.
[2] Addition: Tennessee, week ended Dec. 16, 32 cases.
[3] Including cases reported as salmonellosis.
[4] Addition: Arizona, week ended Dec. 16, 44 cases.

number for 51 weeks of 1950 is now 33,092 as compared with 42,171 for the same period last year.

## Reports of Epidemics

*Infectious hepatitis.* Dr. Kotcher, Kentucky State Department of Health, has reported two outbreaks of infectious hepatitis occurring in two widely separated areas of the State in one week. Only children were affected in each instance. One outbreak occurred in a single school where mothers helped with preparing the school lunch. One such mother had two children with the disease. The symptoms consisted of general malaise, abdominal pain, nausea and vomiting, constipation, and typical increasing jaundice.

*Rabies in ferrets.* Dr. W. L. Bierring, Iowa State Commissioner of Health, has reported an episode in which ferrets were shown to have rabies. A man with a number of ferrets appeared in a town in southern Iowa. He solicited business establishments to contract for elimination of rats, and sold animals to two persons. One ferret died 3 days after it was sold, and a second died 12 days after purchase. Rabies was proved in the latter animal by the Iowa State Veterinary Diagnostic Laboratory. The purchaser of the second ferret had been bitten by the animal and was given antirabies vaccine. The original owner of the ferrets was eventually located in Kansas through cooperation of various State agencies in Iowa and Kansas. The State Health Department of Kansas learned that the man had returned to his home in Kansas because his remaining ferrets had died of a disease which he thought was distemper. He, too, had been bitten and antirabies vaccine was advised.

(NOTE: In Iowa, 360 rabid animals have been reported this year, and Kansas has reported 48.)

## *Deaths During Week Ended December 23, 1950*

| | *Week ended Dec. 23, 1950* | *Corresponding week, 1949* |
|---|---|---|
| Data for 93 large cities of the United States. | | |
| Total deaths | 9, 170 | 9, 399 |
| Median for 3 prior years | 8, 890 | |
| Total deaths, first 51 weeks of year | 466, 949 | 467, 090 |
| Deaths under 1 year of age | 591 | 639 |
| Median for 3 prior years | 639 | |
| Deaths under 1 year of age, first 51 weeks of year | 31, 858 | 33, 231 |
| Data from industrial insurance companies: | | |
| Policies in force | 69, 600, 434 | 69, 928, 911 |
| Number of death claims | 12, 173 | 12, 277 |
| Death claims per 1,000 policies in force, annual rate | 9. 1 | 9. 2 |
| Death claims per 1,000 policies, first 51 weeks of year, annual rate | 9. 2 | 9. 1 |

## Reported Cases of Selected Communicable Diseases: United States, Week Ended December 23, 1950

[Numbers under diseases are International List numbers, 1948 revision]

| Area | Diphtheria (055) | Encephalitis, infection (082) | Influenza (480-483) | Measles (085) | Meningitis, meningococcal (057.0) | Pneumonia (490-493) | Poliomyelitis (080) |
|---|---|---|---|---|---|---|---|
| **United States** | 94 | 14 | 3,161 | [illegible],827 | 61 | 1,085 | 251 |
| **New England** | 1 | | 5 | 163 | 4 | 35 | 6 |
| Maine | | | 3 | 4 | 1 | 4 | 3 |
| New Hampshire | | | 2 | 28 | | | |
| Vermont | | | | 11 | | | |
| Massachusetts | 1 | | | 11 | 3 | | 1 |
| Rhode Island | | | | 4 | | 2 | |
| Connecticut | | | | [illegible] | | 29 | 2 |
| **Middle Atlantic** | 8 | 1 | 5 | 532 | 14 | 278 | 43 |
| New York | 7 | 1 | [1]2 | 178 | 5 | 170 | 33 |
| New Jersey | | | 3 | 31 | 1 | 66 | 3 |
| Pennsylvania | 1 | | | [illegible] | 8 | 42 | 7 |
| **East North Central** | 8 | 4 | 29 | 800 | 6 | 107 | 49 |
| Ohio | 5 | | | [illegible] | 1 | | 14 |
| Indiana | | | 12 | | 1 | 14 | 2 |
| Illinois | 1 | [illegible] | 1 | 111 | [illegible] | 46 | 10 |
| Michigan | 2 | 2 | | 134 | 1 | 33 | 21 |
| Wisconsin | | | 16 | 87 | | 11 | [illegible] |
| **West North Central** | 13 | 2 | 18 | 332 | 7 | 68 | 20 |
| Minnesota | [illegible] | | | 101 | | 10 | 2 |
| Iowa | 2 | | | 1 | 1 | 1 | 7 |
| Missouri | 4 | 1 | 1 | 11 | | 15 | 1 |
| North Dakota | | | 1 | 4 | 1 | 52 | 2 |
| South Dakota | | 1 | | 9 | | | |
| Nebraska | 2 | | | | | | 1 |
| Kansas | | | 4 | 102 | | 10 | 4 |
| **South Atlantic** | 19 | | 479 | 167 | 8 | 130 | 33 |
| Delaware | | | | 1 | | | |
| Maryland | 1 | | | 4 | 2 | 22 | 3 |
| District of Columbia | | | | 8 | 1 | 10 | |
| Virginia | 2 | | 200 | 22 | | 47 | 4 |
| West Virginia | | | [illegible] | 7 | | 10 | 1 |
| North Carolina | 11 | | | [illegible] | 1 | | 6 |
| South Carolina | 3 | | 18 | 2 | 1 | 21 | 1 |
| Georgia | 1 | | 52 | 36 | | 12 | 11 |
| Florida | 1 | | 1 | 8 | | 8 | 7 |
| **East South Central** | 15 | 1 | 54 | 26 | 4 | 40 | 8 |
| Kentucky | 4 | | | 2 | 2 | 11 | 1 |
| Tennessee | 8 | | 21 | 12 | 1 | | 1 |
| Alabama | 2 | | [illegible] | 3 | 1 | 21 | 4 |
| Mississippi | 1 | 1 | 1 | 9 | | 5 | 2 |
| **West South Central** | [illegible]0 | 3 | [illegible],394 | 311 | 12 | 348 | 26 |
| Arkansas | 3 | 1 | 171 | 73 | 1 | 27 | 3 |
| Louisiana | 3 | | 1 | 7 | 1 | 30 | 8 |
| Oklahoma | 3 | | [illegible] | 21 | 1 | 19 | 5 |
| Texas | 11 | 1 | [illegible] | 210 | 9 | 272 | 10 |
| **Mountain** | [illegible] | 1 | [illegible]73 | [illegible]49 | 2 | 52 | 11 |
| Montana | [illegible] | | 8 | 7 | | 1 | 1 |
| Idaho | | | 40 | 94 | | 8 | |
| Wyoming | | 1 | | 4 | | 1 | 1 |
| Colorado | | | 10 | 17 | 2 | 10 | 2 |
| New Mexico | | | | [illegible] | | 2 | 3 |
| Arizona | | | [illegible]11 | 12 | | [illegible] | 2 |
| Utah | | | 1 | 11 | | 1 | 2 |
| Nevada | | | | 2 | | | |
| **Pacific** | 8 | 3 | 4 | 247 | 4 | 27 | 55 |
| Washington | | | | 111 | | | 13 |
| Oregon | 1 | | 1 | 16 | | 8 | 9 |
| California | 1 | 3 | | 120 | 4 | [illegible] | 33 |
| Alaska | | | | | | 4 | 4 |
| Hawaii | | | 95 | | | | |

[1] New York City only.

*Anthrax*: Pennsylvania, 1 case.

## Reported Cases of Selected Communicable Diseases: United States, Week Ended December 23, 1950—Continued

[Numbers under diseases are International List numbers, 1948 revision]

| Area | Rocky Mountain spotted fever (104) | Scarlet fever (050) | Smallpox (084) | Tularemia (059) | Typhoid and paratyphoid fever (040,041) | Whooping cough (056) | Rabies in animals |
|---|---|---|---|---|---|---|---|
| **United States** | 4 | 1,215 | | 24 | 43 | 1,384 | 83 |
| **New England** | | 106 | | | 1 | [illegible] | |
| Maine | | 11 | | | | 2 | |
| New Hampshire | | 2 | | | | 3 | |
| Vermont | | 4 | | | | 13 | |
| Massachusetts | | 47 | | | 1 | [illegible] | |
| Rhode Island | | [illegible] | | | | 17 | |
| Connecticut | | [illegible] | | | | 18 | |
| **Middle Atlantic** | 1 | 185 | | | 8 | 247 | 12 |
| New York | 1 | 124 | | | 1 | 102 | 12 |
| New Jersey | | 17 | | | | 75 | |
| Pennsylvania | | 44 | | | 7 | 70 | |
| **East North Central** | | 272 | | 6 | 3 | 250 | 13 |
| Ohio | | 42 | | 1 | | 40 | |
| Indiana | | 23 | | | | [illegible] | 8 |
| Illinois | | [illegible] | | 4 | | 37 | |
| Michigan | | 113 | | | 1 | 84 | |
| Wisconsin | | 42 | | 1 | 2 | 80 | |
| **West North Central** | | 77 | | | 7 | 73 | 5 |
| Minnesota | | 11 | | | | [illegible] | 1 |
| Iowa | | 10 | | | 1 | 1 | [illegible] |
| Missouri | | [illegible] | | | 1 | 8 | |
| North Dakota | | 2 | | | | 2 | |
| South Dakota | | 1 | | | | | |
| Nebraska | | 2 | | | | 1 | |
| Kansas | | 24 | | | 2 | 17 | |
| **South Atlantic** | 1 | 143 | | 5 | 8 | 196 | 13 |
| Delaware | | 7 | | | | 8 | |
| Maryland | | [illegible] | | 2 | | 17 | |
| District of Columbia | | 8 | | | 2 | 3 | |
| Virginia | 1 | 20 | | 1 | 1 | 18 | 1 |
| West Virginia | | 7 | | | | [illegible] | 2 |
| North Carolina | | [illegible] | | | | 81 | |
| South Carolina | | 3 | | | 1 | 1 | [illegible] |
| Georgia | | 12 | | 2 | 4 | [illegible] | [illegible] |
| Florida | | 10 | | | | 15 | |
| **East South Central** | 2 | 79 | | 5 | 5 | 33 | 9 |
| Kentucky | | 11 | | | | 10 | |
| Tennessee | | 50 | | [illegible] | 2 | 11 | |
| Alabama | 1 | 15 | | | | 7 | 4 |
| Mississippi | 1 | 3 | | 3 | | 2 | |
| **West South Central** | | 76 | | 7 | 5 | [illegible] | 28 |
| Arkansas | | 12 | | 2 | 3 | 16 | 3 |
| Louisiana | | 7 | | 3 | | 3 | |
| Oklahoma | | 11 | | | | 14 | 1 |
| Texas | | [illegible] | | 2 | 2 | [illegible] | [illegible] |
| **Mountain** | | 88 | | 1 | 1 | 89 | |
| Montana | | [illegible] | | 1 | | [illegible] | |
| Idaho | | 30 | | | | 1 | |
| Wyoming | | | | | | [illegible] | |
| Colorado | | 17 | | | | 10 | |
| New Mexico | | 3 | | | | 11 | |
| Arizona | | 10 | | | 1 | 15 | |
| Utah | | 23 | | | | 1 | |
| Nevada | | | | | | | |
| **Pacific** | | 189 | | | 5 | 74 | |
| Washington | | 56 | | | | [illegible] | |
| Oregon | | 19 | | | 1 | 7 | |
| California | | 111 | | | 1 | 38 | |
| Alaska | | | | | | 2 | |
| Hawaii | | 3 | | | | | |

[1] Including cases reported as salmonellosis.
[2] Including cases reported as streptococcal sore throat.

# FOREIGN REPORTS

## PANAMA

*Poliomyelitis.* During the period September 1 to December 7, 1950, 68 cases (3 deaths) of poliomyelitis were reported in Panama, of which 26 cases were in the Canal Zone. For the 3-month periods September–November in 1945 to 1948 the maximum number was five cases. Data for 1949 are not available. There were 18 cases reported in Panama City during the period considered in 1950.

## REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

The following reports include only items of unusual incidence or of special interest and the occurrence of these diseases, except yellow fever, in localities which had not recently reported cases. All reports of yellow fever are published currently. A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

### Cholera

*Pakistan.* During the week ended November 18, 1950, three fatal cases of cholera were reported in Dacca.

### Smallpox

*Cambodia.* During the week ended December 9, 1950, six cases of smallpox were reported in Takeo Province.

*Gambia.* For the week ended November 11, 1950, one case of smallpox was reported in Gambia.

*Indonesia.* During the week ended November 25, 1950, 18 cases of smallpox were reported in Surabaya, Java, and 50 cases were reported in Bandjermasin, Borneo. For the week ended November 4, 1950, 17 cases of smallpox were reported in Pontianak, Borneo, as compared with 4 for the previous week.

*Pakistan.* During the weeks ended December 9 and 16, 1950, three cases of smallpox were reported each week in Karachi.

### Typhus Fever

*India.* For the week ended December 9, 1950, four cases of typhus fever were reported in Bombay as compared with three for the week ended December 2.

*Turkey.* During the week ended December 16, 1950, 11 cases of typhus fever were reported in Turkey, 1 of which was reported in Istanbul.

**Yellow Fever**

*Gold Coast* The suspected case of yellow fever reported in Accra on October 11, 1950 and the suspected fatal case reported in Taquah-Aboso have both been confirmed. (See PUBLIC HEALTH REPORTS, November 17, 1950, p. 1535 and December 8, 1950, p. 1655, respectively)

+ + +

The printing of this publication has been approved by the Director of the Bureau of the Budget (August 10, 1949).

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It contains (1) current information regarding the incidence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

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# Public Health Reports

VOLUME 66 JANUARY 19, 1951 NUMBER 3

IN THIS ISSUE

Statistical Studies of Heart Disease, VIII

FEDERAL SECURITY AGENCY

PUBLIC HEALTH SERVICE

**FEDERAL SECURITY AGENCY**
*Oscar R. Ewing, Administrator*

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# Public Health Reports

*Vol. 66* • JANUARY 19, 1951 • *No. 3*

## Statistical Studies of Heart Disease

### VIII. Mortality from Heart Disease among Negroes as Compared with White Persons

By Maryland Y. Pennell, M.Sc.Hyg., and Josephine L. Lehman *

Diseases of the heart (all forms) is the leading cause of death among both the Negro and white population in the United States. Among the Negroes, recorded mortality from the second leading cause, nephritis, was only half as high in 1940 (*1*).

For both races recorded mortality from heart disease has shown an upward trend from 1920 to 1930. The decade 1930-40 continued to show an increase in heart mortality among white persons, but the course among nonwhite persons has been slightly downward (*2*). The age-adjusted death rate from all forms of heart disease per 100,000 population in the United States in 1940 was 330 for nonwhite and 288 for white persons, a nonwhite excess of 15 percent. Differences in heart mortality rates between the two groups have decreased in recent years (*3*), as indicated by the following figures:

| | *1940* | *1941* | *1942* | *1943* | *1944* | *1945* | *1946* | *1947* |
|---|---|---|---|---|---|---|---|---|
| Nonwhite rate | 330 | 326 | 317 | 327 | 313 | 301 | 300 | 320 |
| White rate | 288 | 281 | 281 | 298 | 287 | 285 | 280 | 292 |
| Percentage excess nonwhite over white | 15 | 16 | 13 | 10 | 9 | 7 | 7 | 10 |

The excess of Negro over white heart mortality will be studied in this paper in relation to the effect of differences in environment in urban and rural parts of the several geographic sections of the United States. Consideration will also be given to sex and to age, to see whether the excess of the Negro death rate over the white death rate still holds.

### Source and Limitations of Data

The number of resident deaths from heart disease in 1940 according to geographic section, population-size group, age, sex, and race have

*Division of Public Health Methods, Public Health Service. This is the eighth paper in a series dealing with statistics of heart mortality and morbidity. This series is the result of a joint study undertaken by the Division of Public Health Methods and the National Office of Vital Statistics and is financed in part by the National Heart Institute.

been tabulated by the National Office of Vital Statistics of the Public Health Service. Mortality rates based on these data have been computed and age-adjusted for purposes of geographic comparison.

Both the Negro and white mortality rates have been adjusted to the total United States population, a standard practically equivalent to the age distribution of the white population as Negroes constitute only one-tenth of the total population. For this reason and also because the enumerated Negro population is relatively younger than the white, it follows that age adjustment of the crude death rate from diseases of the heart raises the Negro rate by a considerable amount and makes only a comparatively small change in the white rate.

Deaths from diseases of the heart among the Negroes is one of the classification groups that is known to be underreported. Nearly 5 percent of the Negro deaths are classified as due to senility and ill-defined and unknown causes, subgroups which accounted for less than 2 percent of the white deaths in 1946 (*4*). Therefore, any excess of Negro over white heart mortality may be understated.

The deaths from diseases of the heart (all forms) are those tabulated under code numbers 90–95 of the fifth revision (1938) of the International List of Causes of Death (*5*). In a previous study (*10*) mortality from nephritis and from intracranial lesions of vascular origin were included because they are closely related to hypertension and heart disease. The reporting of multiple causes of death by physicians occurs more frequently in urban areas, particularly near large medical centers, and also occurs more often in the North than in the South. The proportion of the total cardiovascular-renal deaths that are reported as due to heart disease is influenced by these factors. Other possible artifacts in the mortality differences between rural areas and small cities are the failure to allocate deaths properly to the place of residence and the incompleteness of death registration.

Five main divisions of diseases of the heart (as classified by the International List) are considered in this study In addition, three groups of heart diseases not in the 90 95 group are studied: syphilitic heart disease, acute rheumatic fever, and congenital heart disease.

The details of diagnosis of heart disease may be less accurately reported in rural areas. This would lead to some increase in recorded deaths from unspecified types, tabulated as other diseases of the heart, as size of city decreases.

## Distribution of Population

The 13.5 million nonwhite persons enumerated in 1940 represent one-tenth of the total population of the United States, and include 12.9 million Negroes (*6*). The distribution of the Negro population with respect to region and urbanization is not like that of the white population (table 1).

Table 1. *Negro and white mortality from diseases of the heart (all forms) by sex, population-size groups, and geographic sections in the United States—resident age-adjusted [1] mortality per 100,000 population, 1940*

| Region, geographic section, and size of city | Population | | Negro mortality | | | White mortality | | |
|---|---|---|---|---|---|---|---|---|
| | Negro [2] | White | Total | Male | Female | Total | Male | Female |
| United States | 12,865,518 | 118,214,870 | 335.7 | 358.0 | 313.3 | 287.8 | 341.3 | |
| 100,000 and over | 3,502,846 | 34,351,611 | 434.5 | 469.9 | 403.6 | 346.8 | 418.3 | 280.3 |
| 2,500-100,000 | 2,750,712 | 33,621,182 | 376.9 | 429.0 | 330.8 | 299.0 | 371.5 | 233.3 |
| Rural | 6,611,930 | 50,242,017 | 263.7 | 274.9 | 251.0 | 237.6 | 272.7 | 197.4 |
| EAST NORTH | | | | | | | | |
| New England | 101,509 | 8,329,146 | 414.4 | 468.0 | 370.4 | 326.8 | 388.2 | 270.5 |
| 100,000 and over | 61,569 | 2,317,519 | 406.3 | 456.4 | 369.0 | 375.5 | 415.0 | 315.4 |
| 2,500-100,000 | 26,062 | 4,010,649 | 440.9 | 505.5 | 383.1 | 322.9 | 389.6 | 263.9 |
| Rural | 13,878 | 2,000,978 | 402.7 | 443.2 | 349.3 | 283.6 | 332.6 | 232.9 |
| Middle Atlantic | 1,268,366 | 26,237,622 | 452.5 | 471.7 | 433.2 | 357.6 | 417.3 | 299.9 |
| 100,000 and over | 896,331 | 12,209,672 | 457.4 | 483.9 | 435.9 | 389.7 | 452.1 | 330.2 |
| 2,500-100,000 | 250,246 | 7,765,103 | 371.7 | 376.2 | 371.0 | 325.0 | 393.8 | 263.0 |
| Rural | 121,786 | 6,262,817 | 554.5 | 561.9 | 546.3 | 337.6 | 380.9 | 290.4 |
| East North Central | 1,069,326 | 25,528,451 | 411.5 | 476.1 | 407.0 | 291.7 | 341.9 | 240.2 |
| 100,000 and over | 767,012 | 8,625,883 | 458.1 | 490.3 | 430.5 | 343.8 | 408.5 | 280.6 |
| 2,500-100,000 | 212,288 | 7,827,382 | 360.7 | 395.8 | 322.2 | 281.1 | 343.2 | 229.4 |
| Rural | 90,026 | 9,075,180 | 471.4 | 511.0 | 416.7 | 255.0 | 289.8 | 214.9 |
| EAST SOUTH | | | | | | | | |
| South Atlantic | 4,698,863 | 13,095,227 | 333.6 | 363.4 | 304.3 | 258.6 | 317.9 | 200.7 |
| 100,000 and over | 732,415 | 2,093,803 | 411.1 | 492.3 | 399.1 | 318.3 | 405.2 | 243.7 |
| 2,500-100,000 | 1,071,857 | 3,019,696 | 380.1 | 451.4 | 331.6 | 295.3 | 397.2 | 207.5 |
| Rural | 2,894,591 | 7,981,728 | 281.9 | 299.9 | 261.8 | 223.2 | 262.3 | 181.1 |
| East South Central | 2,780,635 | 7,993,755 | 282.6 | 303.0 | 262.1 | 220.0 | 263.0 | 176.6 |
| 100,000 and over | 377,410 | 909,183 | 402.1 | 417.0 | 360.0 | 301.1 | 393.8 | 223.6 |
| 2,500-100,000 | 515,692 | 1,362,427 | 365.2 | 433.3 | 309.4 | 288.0 | 372.2 | 216.3 |
| Rural | 1,887,533 | 5,722,145 | 229.9 | 237.4 | 221.7 | 186.8 | 216.3 | 154.6 |
| WEST CENTRAL | | | | | | | | |
| West South Central | 2,125,121 | 10,569,596 | 291.9 | 307.5 | 282.1 | 219.5 | 269.0 | 167.2 |
| 100,000 and over | 364,727 | 1,581,411 | 411.4 | 495.1 | 393.5 | 326.3 | 427.9 | 237.1 |
| 2,500-100,000 | 554,017 | 2,089,722 | 379.2 | 420.0 | 313.4 | 270.3 | 355.8 | 190.4 |
| Rural | 1,506,377 | 6,295,160 | 224.3 | 225.2 | 223.5 | 167.6 | 197.1 | 132.8 |
| West North Central | 350,992 | 13,111,519 | 371.3 | 383.1 | 356.0 | 226.2 | 270.2 | 180.2 |
| 100,000 and over | 201,532 | 2,509,939 | 404.7 | 442.3 | 393.6 | 281.2 | 352.2 | 216.6 |
| 2,500-100,000 | 77,594 | 3,196,171 | 357.9 | 412.8 | 299.3 | 264.4 | 333.6 | 201.6 |
| Rural | 68,866 | 7,405,406 | 291.8 | 296.3 | 324.1 | 190.4 | 220.0 | 155.5 |
| WEST | | | | | | | | |
| Mountain | 36,411 | 3,978,913 | 406.1 | 461.0 | 339.3 | 248.3 | 291.5 | 196.9 |
| 100,000 and over | 8,530 | 462,509 | 413.9 | 437.3 | 399.2 | 278.6 | 339.6 | 223.0 |
| 2,500-100,000 | 17,374 | 1,275,779 | 435.7 | 549.8 | 298.6 | 301.3 | 376.9 | 223.0 |
| Rural | 10,507 | 2,240,625 | 311.9 | 331.0 | 358.2 | 205.7 | 232.3 | 168.2 |
| Pacific | 134,295 | 9,370,641 | 325.8 | 346.9 | 305.1 | 291.1 | 365.7 | 215.0 |
| 100,000 and over | 90,317 | 3,638,719 | 330.3 | 321.9 | 282.1 | 303.3 | 394.0 | 220.8 |
| 2,500-100,000 | 25,612 | 2,471,250 | 273.3 | 268.0 | 278.0 | 302.6 | 397.1 | 217.1 |
| Rural | 18,366 | 3,257,672 | 545.4 | 545.0 | 544.2 | 265.0 | 311.9 | 203.2 |

[1] Adjusted for age by the direct method to the total population of the United States enumerated in 1940.
[2] Data not given for 588,887 other nonwhite persons.

The majority (58 percent) of the Negro population resides in the East South region (fig. 1). About one-fifth of the Negroes are in the East North region and another fifth in the West Central region. The other 1 percent are in the Mountain and Pacific geographic sections combined. In contrast half (51 percent) of the white population resides in the East North, one-fifth in the East South, one-fifth in the West Central, and 11 percent in the West.

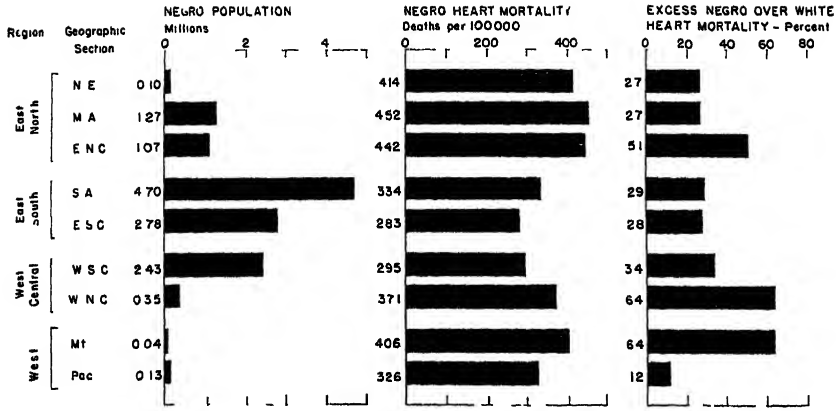


Figure 1. Geographic-sectional comparison of Negro population, Negro mortality from diseases of the heart (all forms), and the percentage excess of Negro over white heart mortality—resident age-adjusted mortality, 1940.

The Negro population of the East South is both urban and rural, with about one-third urban. The East-North Negroes are 91 percent urban, with heavy concentration in the larger cities of 100,000 or more persons. In the West Central region the Negro population has the same pattern of urbanization as that in the Southern States east of the Mississippi River.

The white population in the East South and in the West Central regions is similar to the Negro population in degree of urbanization. In the East North region, however, the white persons are divided about equally among large and small cities and rural areas. Therefore any Negro-white comparison of mortality is unaffected by variation in the degree of urbanization except in the East North region.

## Mortality From Diseases of the Heart (All Forms)

Negro mortality from diseases of the heart (all forms) was 336 per 100,000 population (age-adjusted) in the United States in 1940 (table 1). The male death rate was higher than the female rate in each of the three size-of-city groups. The recorded mortality was higher in urban than in rural areas and increased with population-size. The total Negro heart mortality rate was 17 percent in excess of the white rate.

Among the nine United States census geographic sections, the three forming the North region east of the Mississippi River showed the highest Negro mortality (fig. 1). All of the five geographic sections with 1 million or more Negroes had Negro death rates at least one-fourth higher than the corresponding white rates. In the East North Central section the Negro death rate was one-and-a-half times

the white rate—442 as compared with 292 deaths per 100,000 population; this reflects the Negro concentration in the larger cities where the heart mortality rate was high.

Nonwhite and white mortality rates specific for sex and population-size groups are given in appendix table 1 for each of 28 States with large Negro populations. The discussion in the text, however, will be limited to the three regions illustrated in figure 2.

*Regional Comparison*

The East North, East South, and West South Central regions accounted for 96 percent of the total Negro population in 1940. This regional classification permits a North-South comparison in the eastern section of the United States and an East-Central comparison in the southern section of the United States.

The North-South comparison in the eastern section shows that heart mortality was considerably higher in the North than in the South for each race (fig. 2). This was true for females in the three population-size groups and for males in the larger cities and in rural areas. The exception was the high death rate among Negro and white males in the smaller cities and towns of the South. The North-South difference was greatest in the rural areas where, for both sexes,

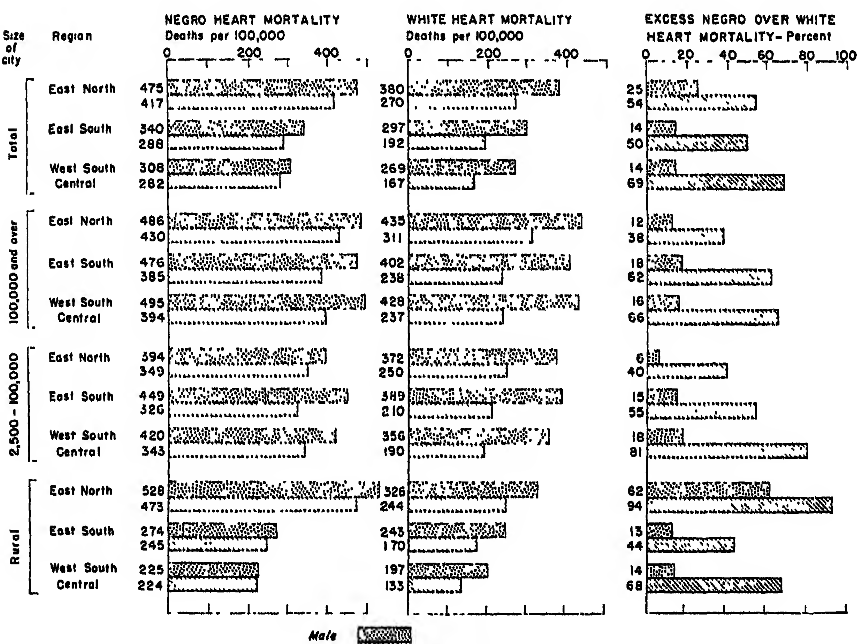


Figure 2. Regional comparison of Negro and white mortality from diseases of the heart (all forms) among males and females, and the percentage excess of Negro over white mortality—resident age-adjusted mortality, specific for race, sex, population-size group, and region, 1940.

the northern death rate was nearly twice the corresponding southern rate. The recorded mortality rates among Negroes may be low due to the underreporting of deaths from heart disease. However, among white males and females in rural areas there was a northern excess in mortality amounting to 34 and 44 percent, respectively, over the southern death rates The excess of Negro heart mortality over the white rate was higher in the North than in the South in the rural areas; the reverse was apparent for urban areas.

The East-Central comparison in the southern section does not show as consistent or as wide differences as noted above. Somewhat higher mortality rates for the smaller cities and for the rural areas were reported in the East than in the Central region. In the rural areas heart disease mortality was about one-fourth higher in the East among Negro males and among white males and females; the excess among Negro females was only 9 percent. In the larger cities with 100,000 or more inhabitants, however, the death rates for the East were equal to or slightly less than the corresponding Central rates for each sex and race. There was only a slight tendency for the Central region to show a greater excess of Negro-over-white mortality

*Population-Size Differences*

Recorded mortality from diseases of the heart was higher in urban than in rural parts of the United States for each sex and each racial group. For Negro males the urban heart mortality rate was 449 deaths per 100,000 (age-adjusted) as compared with the rural rate of only 275; for Negro females the corresponding rates were 369 and 251 per 100,000 (fig. 3). The urban rates were thus 63 and 47 percent higher than the rural rates for these two groups. For white males and females the excess of urban mortality over rural death rates amounted to 45 and 30 percent. When urban and rural rates are compared, the excess of Negro-over-white mortality was greater in urban areas.

The urban death rate was markedly higher than the rural rate in the East South and the West South Central regions for both Negro and white males and females. In these two regions the difference in heart mortality between cities of the two size groups shown in figure 2 was consistent in the pattern of decreased recorded heart mortality with a descending order of population size. The difference was greatest among males in the West South Central region, where the rural mortality rate was less than half the rate recorded for the large cities with 100,000 or more inhabitants.

Only in the East North region was Negro heart mortality higher in rural than in urban areas. The white mortality, however, was of the pattern consistent with the other two regions although the urban excess was slight. This was the only region in which the urban excess of Negro-over-white mortality was less than the rural excess.

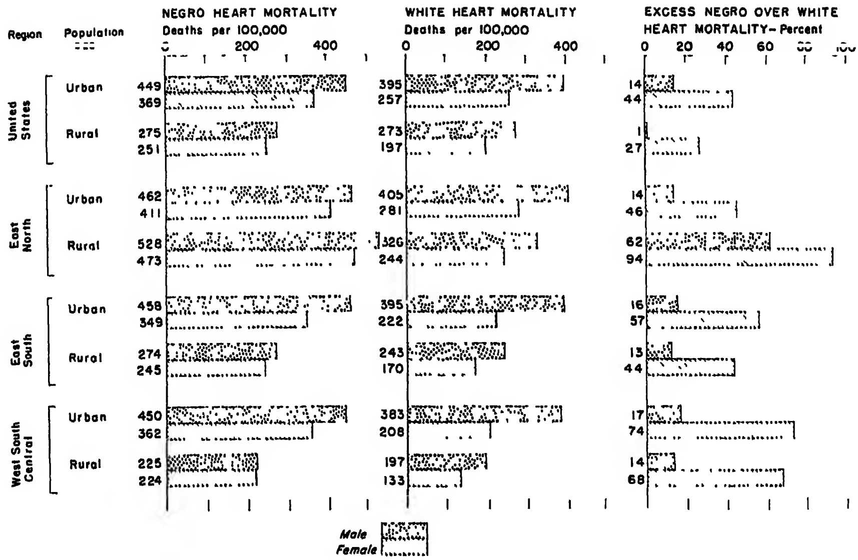


**Figure 3.** **Urban-rural comparison of Negro and white mortality from diseases of the heart (all forms) among males and females, and the percentage excess of Negro over white mortality—resident age-adjusted mortality, specific for race, sex, population-size group, and region, 1940.**

How much of the urban-rural difference can be attributed to inaccuracy of reporting cause of death in rural areas is unknown. In a previous study (*10*) it has been shown that the addition of old-age causes of death to heart disease mortality made little difference in the excess of urban over rural rates among white persons in the East North and East South regions. However, it should be remembered that some of the difference between rural areas and small cities may be due to failure to allocate deaths properly to place of residence and to incompleteness of registration.

### *Male-Female Comparison*

Heart mortality among Negro males was consistently higher than that among Negro females in each of the three regions and in each of the population-size groups (figs. 2 and 3). The difference between male and female death rates was greatest in the small cities and towns of the East South region, where the male rate was 38 percent higher than the female rate. Sex differences in mortality tended to be higher in urban than in rural areas and in the South than in the North.

Sex ratios of heart mortality were higher among white persons than among the Negroes. The same relationships with size of city and region held, but there was a higher male percentage excess among the white population. For example, the excess of male mortality over female mortality in the middle population-size group in the East



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South region was 85 percent for white persons, as compared with the 38 percent for Negroes quoted above.

The Negro percentage excess in heart mortality over the white rate was consistently higher for females than for males. This is illustrated by the differences in the lengths of the bars for the two sexes in the right side of figures 2 and 3. The most striking difference is apparent for the middle population-size group in the West South Central region; the Negro mortality rate was 18 percent higher than the white rate for males but 81 percent higher for females.

### *Variation with Age*

Variation in mortality from diseases of the heart with age is illustrated in figure 4 which gives the age-specific mortality curves for each sex and race for the United States and the East North and the East South regions—total, urban, and rural. The increase with age from 15 years onward is shown on semi-logarithmic grids; the basic data are the sums of the rates for the five specific forms of heart disease given in appendix table 2.

For the country as a whole, heart mortality among Negro males was lower than among Negro females in the two age groups under 25 years, then increasingly higher thereafter, with the greatest percentage excess in the oldest age groups. The mortality curves for white persons showed consistently higher male rates, with the greatest sex differences in the age span 35–64 years. The percentage excess in heart mortality of Negroes over white persons was greatest during the middle adult years; among females the Negro rate was three to four times the white rate at ages 25–54 years. During the older ages, Negro mortality increased at a much slower rate and at age 65 fell below white mortality, possibly an effect of diseases of the coronary arteries which is presented later (fig. 6). In the East North region the retardation during the older ages was not as great as in the East South. Negro mortality in the older ages may be affected by misstatement of age, which would account for part of this difference.

Heart mortality rates for Negroes in rural areas of the United States (and in the East South) increased at slower rates with age than did the rates for urban Negroes. Males under middle age showed lower rates than females in rural areas, but in urban areas they exceeded the females at all ages.

## Mortality from Eight Specific Forms of Heart Disease

Deaths from five main divisions of diseases of the heart and from three closely related diseases have been tabulated according to the International List of Causes of Death (1938 revision) as follows:

| Diseases of the heart: | Code numbers |
|---|---|
| Diseases of the coronary arteries and angina pectoris | 91a-b |
| Acute endocarditis (except rheumatic) | 91a-e |
| Chronic affections of the valves and endocardium and other chronic rheumatic heart disease | 90a, 92a-e, 93c, 95b |
| Diseases of the myocardium | 93a-b, d e |
| Other diseases of the heart | 90b, 95a, e |
| Closely related diseases: | |
| Acute rheumatic fever | 58 |
| Syphilitic heart disease | 30d, e |
| Congenital heart disease | 157e, f |

Negro mortality rates for each of the five specific forms of diseases of the heart are given in table 2 by race and sex for three size-of-city groups in the United States and each of seven geographic sections. The discussion in the text, however, will be limited to the United States and to the North and South sections of the eastern United States--the East North and the East South regions (fig. 5). For the three related diseases with low mortality rates, data for the United States only are presented in table 3 and figure 5. Differences in mortality related to region, population-size, sex, and age previously presented for all forms combined will now be discussed for each of the specific forms of heart disease.

Diseases of the myocardium accounted for slightly more than half of the total Negro deaths from all forms of heart disease in the United States in 1940. In second place, with about one-fifth of the deaths, were those tabulated as due to chronic valvular heart disease. About an equal number of deaths were coded as due to diseases of the coronary arteries (and angina pectoris) and to other diseases of the heart, usually an unspecified form. The fifth main division, with less than 1 percent of the total deaths, was acute endocarditis. Among white persons a larger proportion of the heart disease deaths were accounted for by diseases of the coronary arteries; and a smaller proportion, by valvular heart disease and by other diseases of the heart (*13*).

### *Male-Female Comparison*

Heart mortality among Negroes in the United States was higher for men than for women for six of the eight forms of heart disease (fig. 5). The greatest sex differential was apparent for syphilitic heart disease, with the male rate over three times the female rate (about the same difference as among white persons). Death rates from diseases of the coronary arteries among males exceeded those among females by 42 percent (141 percent among white persons). The sex difference for congenital heart disease was 34 percent (31 percent among white persons); less sex differences were apparent for the other forms of heart disease.

Acute endocarditis resulted in higher mortality rates among females than among males in the Negro population. For acute rheumatic

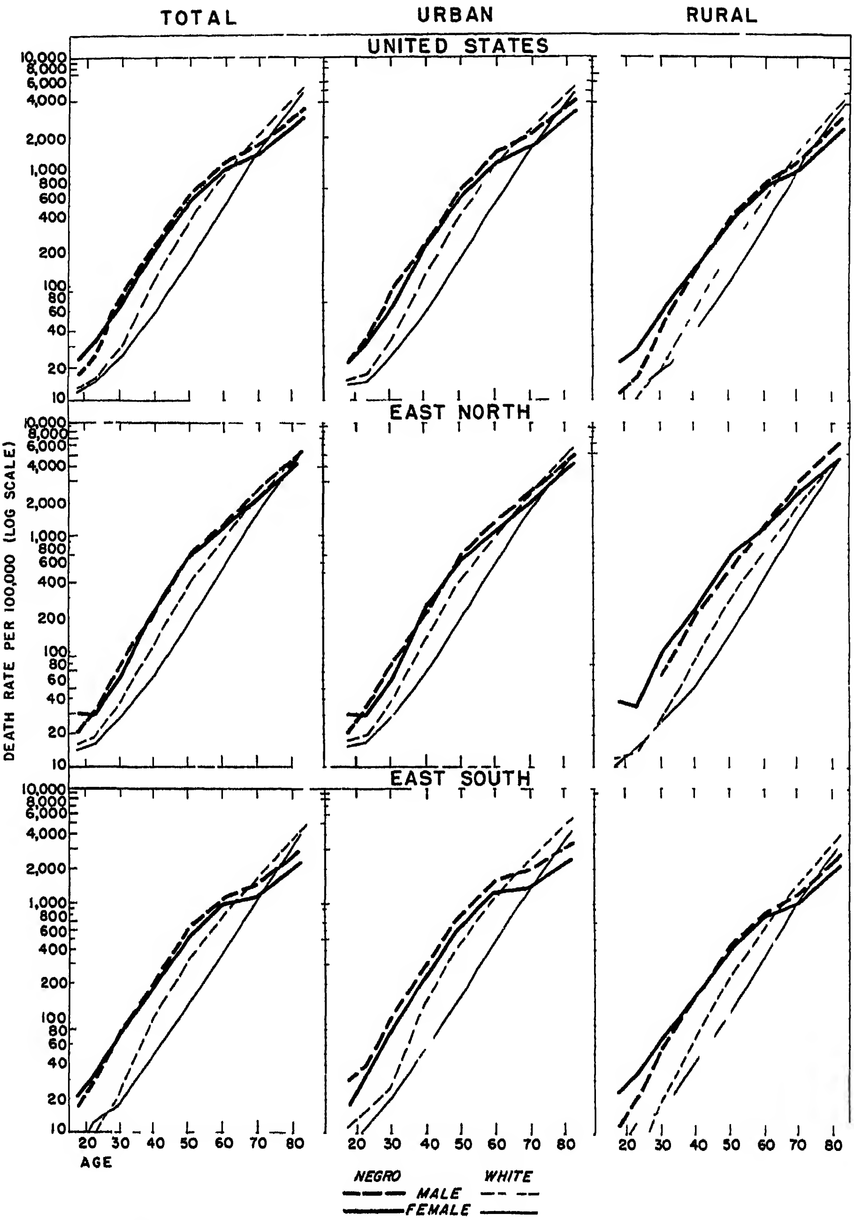


Figure 4. Age-specific mortality from diseases of the heart (all forms) among Negro and white males and females in the United States and in North and South sections of the eastern United States—total, urban, and rural, 1940.

fever the same was true in the white population as well as the Negro. These differences are borne out in the Negro age-specific rates presented in appendix tables 2 and 3—for acute endocarditis in the older age groups and for acute rheumatic fever at nearly all ages.

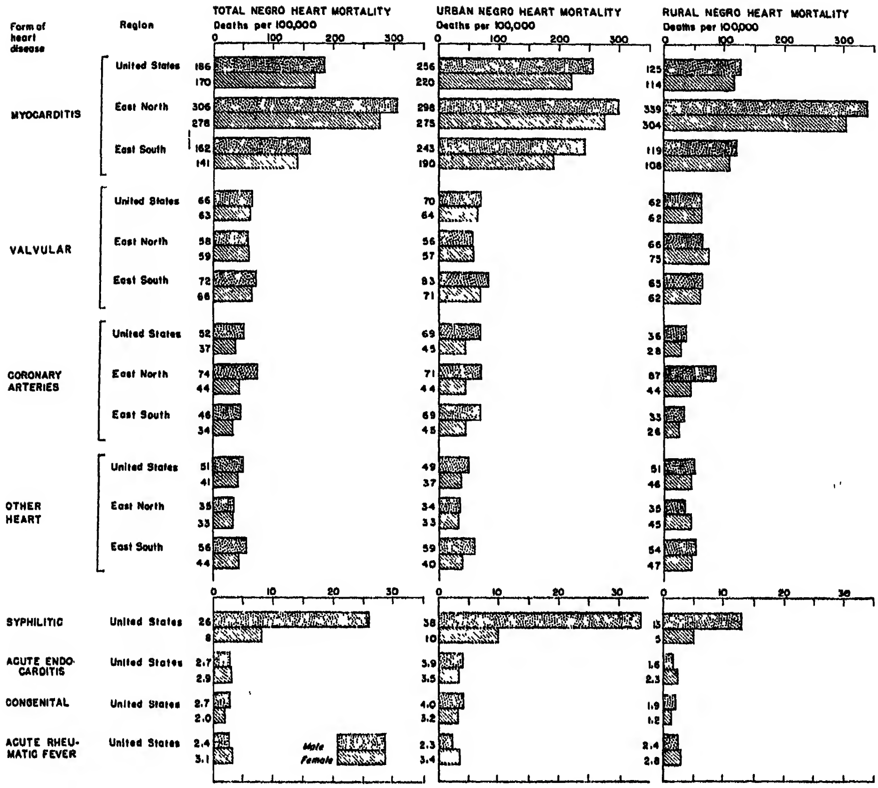


Figure 5. Negro mortality from eight specific forms of heart disease among males and females in the United States and in North and South sections of the eastern United States—total, urban, and rural—resident age-adjusted mortality, specific for race, sex, population-size group, and region, 1940.

The percentage excess of Negro male over female heart mortality was higher in urban than in rural parts of the United States for each form of heart disease with the exception of acute rheumatic fever and congenital heart disease. Among white persons the exceptions were valvular heart disease and congenital heart disease.

### *North-South Comparison*

That Negro mortality from all forms of heart disease was higher in the North than in the South sections of the eastern United States is due to the North-South difference in rates for diseases of the myocardium and for diseases of the coronary arteries. The northern mortality rates from diseases of the myocardium were nearly double the southern rates for males and for females (fig. 5). For diseases of the coronary arteries the northern rate was 59 percent in excess of the southern rate for males, 31 percent for females. The other three

Table 2. *Negro and white mortality from five specific forms of diseases of the heart by sex, population-size groups, and geographic sections in the United States—resident age-adjusted* [1] *mortality per 100,000 population, 1940*

| Region, geographic section, and size of city | Diseases of the coronary arteries | | Acute endocarditis | | Chronic affections of the valves and endocardium | | Diseases of the myocardium | | Other diseases of the heart | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Male | Female | Male | Female | Male | Female | Male | Female | Male | Female |
| | | | | | Negro mortality | | | | | |
| United States [2] | 52.25 | 36.78 | 2.74 | 2.90 | 66.08 | 62.54 | 186.31 | 169.95 | 50.62 | 41.16 |
| 100,000 and over | 68.73 | 44.27 | 3.41 | 2.73 | 58.75 | 65.51 | 300.17 | 259.88 | 38.84 | 31.22 |
| 2,500-100,000 | 71.36 | 45.58 | 4.58 | 4.39 | 83.83 | 62.23 | 206.59 | 174.43 | 62.62 | 44.15 |
| Rural | 35.90 | 27.52 | 1.60 | 2.26 | 61.87 | 61.53 | 124.66 | 114.02 | 50.83 | 45.64 |
| EAST NORTH | | | | | | | | | | |
| New England | 91.86 | 63.07 | 5.94 | 1.93 | 48.48 | 65.00 | 296.67 | 207.57 | 25.05 | 32.73 |
| 100,000 and over | 86.17 | 58.32 | 10.04 | — | 45.56 | 67.54 | 305.24 | 226.29 | 9.37 | 16.87 |
| 2,500-100,000 | 92.99 | 79.89 | — | 7.41 | 48.29 | 57.57 | 306.89 | 190.11 | 57.33 | 48.09 |
| Rural | 108.77 | 57.60 | — | — | 57.87 | 64.91 | 245.62 | 148.65 | 30.92 | 78.12 |
| Middle Atlantic | 79.56 | 40.95 | 2.22 | 3.39 | 53.22 | 60.28 | 314.55 | 302.55 | 25.15 | 26.04 |
| 100,000 and over | 73.86 | 36.66 | 2.69 | 2.65 | 52.72 | 56.09 | 338.00 | 320.99 | 16.62 | 19.50 |
| 2,500-100,000 | 86.41 | 48.65 | 1.04 | 3.99 | 55.56 | 67.94 | 187.48 | 210.56 | 45.07 | 39.82 |
| Rural | 91.32 | 53.04 | 1.50 | 7.04 | 47.42 | 70.77 | 392.40 | 373.57 | 29.23 | 41.90 |
| East North Central | 65.44 | 45.27 | 2.40 | 2.24 | 62.00 | 56.92 | 300.58 | 260.74 | 45.66 | 41.79 |
| 100,000 and over | 56.77 | 46.35 | 2.41 | 2.01 | 50.11 | 54.17 | 337.03 | 285.70 | 43.66 | 42.30 |
| 2,500-100,000 | 76.18 | 40.00 | 4.42 | 1.91 | 74.25 | 53.36 | 192.58 | 178.75 | 48.41 | 39.15 |
| Rural | 79.35 | 32.76 | — | 5.21 | 85.45 | 75.71 | 305.90 | 256.05 | 40.26 | 46.96 |
| EAST SOUTH | | | | | | | | | | |
| South Atlantic | 49.78 | 36.55 | 2.71 | 2.93 | 68.59 | 60.96 | 178.97 | 156.17 | 63.34 | 47.69 |
| 100,000 and over | 70.05 | 45.96 | 4.01 | 4.29 | 71.67 | 72.56 | 303.17 | 240.05 | 43.08 | 36.26 |
| 2,500-100,000 | 71.13 | 46.82 | 5.66 | 4.02 | 86.45 | 64.32 | 215.94 | 171.98 | 75.26 | 47.41 |
| Rural | 36.57 | 28.60 | 1.26 | 2.02 | 61.24 | 55.83 | 137.47 | 123.83 | 63.35 | 51.52 |
| East South Central | 40.67 | 28.87 | 2.92 | 2.40 | 76.49 | 72.92 | 137.61 | 118.73 | 45.27 | 39.14 |
| 100,000 and over | 74.38 | 51.00 | 3.81 | 3.87 | 70.10 | 78.67 | 247.53 | 191.21 | 51.21 | 35.29 |
| 2,500-100,000 | 60.01 | 34.17 | 4.23 | 4.47 | 101.32 | 74.18 | 214.00 | 163.46 | 53.75 | 33.11 |
| Rural | 28.39 | 21.79 | 2.38 | 1.29 | 70.08 | 71.31 | 94.65 | 85.78 | 41.85 | 41.51 |
| WEST CENTRAL | | | | | | | | | | |
| West South Central | 46.61 | 38.03 | 3.08 | 3.91 | 58.94 | 54.28 | 139.61 | 139.67 | 59.30 | 46.17 |
| 100,000 and over | 79.43 | 53.16 | 4.44 | 2.36 | 61.69 | 62.97 | 264.83 | 232.99 | 84.97 | 41.98 |
| 2,500-100,000 | 67.16 | 48.79 | 5.83 | 6.40 | 76.41 | 50.46 | 196.07 | 180.02 | 74.51 | 57.74 |
| Rural | 31.49 | 28.50 | 1.64 | 3.15 | 51.68 | 53.85 | 93.30 | 96.51 | 47.00 | 41.49 |
| West North Central | 62.31 | 43.66 | 1.57 | 1.04 | 74.18 | 85.69 | 219.42 | 204.19 | 25.67 | 22.02 |
| 100,000 and over | 61.64 | 39.63 | 2.58 | 1.59 | 62.57 | 94.66 | 261.57 | 243.28 | 23.98 | 14.16 |
| 2,500-100,000 | 79.09 | 53.21 | — | — | 112.42 | 55.96 | 190.47 | 159.20 | 30.78 | 30.89 |
| Rural | 46.97 | 42.66 | — | | 53.27 | 100.90 | 142.28 | 149.38 | 23.81 | 31.17 |
| | | | | | White mortality | | | | | |
| United States [2] | 111.93 | 46.54 | 1.98 | 1.69 | 39.50 | 31.84 | 162.91 | 135.00 | 25.01 | 15.71 |
| 100,000 and over | 131.46 | 51.39 | 2.44 | 1.94 | 37.51 | 36.51 | 226.98 | 178.36 | 19.89 | 12.15 |
| 2,500-100,000 | 137.24 | 52.34 | 2.21 | 1.83 | 39.04 | 31.08 | 166.37 | 120.66 | 26.06 | 15.42 |
| Rural | 82.43 | 37.96 | 1.48 | 1.39 | 39.63 | 33.90 | 122.10 | 105.49 | 27.08 | 18.66 |
| EAST NORTH | | | | | | | | | | |
| New England | 142.18 | 58.13 | 2.35 | 1.99 | 41.47 | 38.96 | 179.82 | 157.95 | 22.31 | 13.47 |
| 100,000 and over | 143.43 | 55.18 | 2.29 | 2.18 | 39.44 | 41.65 | 242.02 | 204.24 | 17.81 | 12.15 |
| 2,500-100,000 | 152.01 | 60.00 | 2.75 | 1.82 | 39.34 | 38.43 | 173.19 | 150.44 | 22.29 | 13.25 |
| Rural | 122.50 | 57.21 | 1.62 | 2.12 | 44.93 | 35.83 | 137.29 | 122.63 | 26.24 | 15.14 |
| Middle Atlantic | 127.43 | 52.79 | 2.34 | 1.86 | 42.57 | 41.58 | 228.15 | 192.12 | 16.81 | 11.52 |
| 100,000 and over | 132.18 | 54.01 | 2.11 | 1.59 | 39.81 | 43.00 | 265.93 | 222.94 | 12.09 | 8.70 |
| 2,500-100,000 | 136.85 | 52.96 | 2.56 | 2.13 | 40.42 | 37.92 | 195.19 | 157.73 | 18.76 | 12.28 |
| Rural | 107.55 | 50.30 | 2.41 | 2.02 | 46.63 | 42.34 | 202.53 | 180.12 | 21.76 | 15.59 |
| East North Central | 105.72 | 45.17 | 2.12 | 1.99 | 39.36 | 34.00 | 166.66 | 140.88 | 28.06 | 18.16 |
| 100,000 and over | 112.57 | 46.52 | 2.63 | 2.46 | 35.12 | 33.69 | 228.63 | 180.44 | 29.50 | 17.46 |
| 2,500-100,000 | 122.48 | 48.20 | 1.90 | 1.83 | 36.99 | 32.19 | 155.25 | 130.57 | 26.63 | 16.64 |
| Rural | 86.96 | 41.12 | 1.73 | 1.59 | 42.10 | 34.86 | 132.02 | 117.60 | 27.02 | 19.69 |

See footnotes at end of table.

Table 2. *Negro and white mortality from five specific forms of diseases of the heart by sex, population-size groups, and geographic sections in the United States—resident age-adjusted* [1] *mortality per 100,000 population, 1940*—Continued

| Region, geographic section, and size of city | Diseases of the coronary arteries | | Acute endocarditis | | Chronic affections of the valves and endocardium | | Diseases of the myocardium | | Other diseases of the heart | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Male | Female | Male | Female | Male | Female | Male | Female | Male | Female |
| | White mortality | | | | | | | | | |
| EAST SOUTH | | | | | | | | | | |
| South Atlantic | 106.64 | 41.10 | 1.87 | 1.47 | 39.25 | 31.26 | 135.74 | 106.62 | 34.38 | 20.27 |
| 100,000 and over | 145 70 | 52.37 | 3.10 | 2.40 | 37.53 | 30.92 | 199.12 | 147.59 | 19.76 | 10.47 |
| 2,500-100,000 | 156.70 | 50.62 | 2.28 | 1.44 | 38.52 | 29.29 | 162.60 | 106.68 | 37.12 | 19.43 |
| Rural | 75.06 | 32 25 | 1.32 | 1.18 | 39.76 | 32 40 | 108.18 | 90.96 | 37.34 | 24.35 |
| East South Central | 79.41 | 35.58 | .84 | .83 | 43.64 | 34.75 | 103.35 | 81.99 | 35.71 | 23.43 |
| 100,000 and over | 171.22 | 59.17 | .93 | 2.03 | 27 76 | 22.12 | 162.78 | 124.54 | 28.08 | 15 76 |
| 2,500-100,000 | 132.86 | 52.83 | .92 | 1.14 | 49.81 | 38.82 | 152.51 | 102.11 | 36.10 | 21.43 |
| Rural | 51.16 | 25.37 | .82 | .52 | 44.46 | 36.10 | 83.26 | 66.87 | 36.59 | 25.71 |
| WEST CENTRAL | | | | | | | | | | |
| West South Central | 91.65 | 40.26 | 1.51 | 1.14 | 28.98 | 23.84 | 105.02 | 81.13 | 38.88 | 20.86 |
| 100,000 and over | 155.77 | 57.80 | 2.97 | 1.44 | 28.29 | 29 64 | 194.07 | 130.41 | 46.82 | 17.69 |
| 2,500-100,000 | 113.61 | 51.88 | 1.85 | 1.88 | 30.53 | 21.70 | 136.23 | 92.77 | 43.63 | 22.19 |
| Rural | 60.05 | 28.50 | .97 | .70 | 28.31 | 23.32 | 73.05 | 59.09 | 34.66 | 21.18 |
| West North Central | 98 42 | 41.81 | 1.81 | 1.90 | 39.03 | 34.05 | 108.76 | 87.62 | 22.14 | 14.84 |
| 100,000 and over | 133.28 | 50.58 | 2.25 | 1.65 | 37.70 | 31.90 | 159.32 | 117.21 | 19.69 | 12.24 |
| 2,500-100,000 | 130.82 | 51.45 | 2.13 | 2.17 | 12.25 | 35.40 | 130.20 | 96.61 | 27.91 | 15.98 |
| Rural | 74.90 | 33.59 | 1.37 | 1.89 | 37.59 | 32.91 | 85.68 | 71.78 | 20.42 | 15.31 |

[1] Adjusted for age by the direct method to the population of the United States enumerated in 1940.
[2] Includes the Mountain and Pacific geographic sections for which mortality rates are not presented separately.

Table 3. *Negro and white mortality from acute rheumatic fever, syphilitic heart disease, and congenital heart disease by sex and population-size groups in the United States—resident age-adjusted* [1] *mortality per 100,000 population, 1940*

| Size of city | Acute rheumatic fever | | Syphilitic heart disease | | Congenital heart disease | |
|---|---|---|---|---|---|---|
| | Male | Female | Male | Female | Male | Female |
| | Negro mortality | | | | | |
| United States | 2.37 | 3.00 | 26.06 | 8.02 | 2.68 | 2.00 |
| 100,000 and over | 2.10 | 3.47 | 16.49 | 11.91 | 4.89 | 3.75 |
| 2,500-100,000 | 2.57 | 3.27 | 26.99 | 8.58 | 2.82 | 2.60 |
| Rural | 2.45 | 2.85 | 12.90 | 4.85 | 1.91 | 1.24 |
| | White mortality | | | | | |
| United States | 1.15 | 1.19 | 4.29 | 1.08 | 5.84 | 4.45 |
| 100,000 and over | 1.20 | 1.33 | 6.75 | 1.58 | 5.82 | 4.56 |
| 2,500-100,000 | 1.35 | 1.23 | 4.33 | .98 | 7.05 | 5.57 |
| Rural | 1.02 | 1.10 | 2.56 | .74 | 5.22 | 3.83 |

[1] Adjusted for age by the direct method to the population of the United States enumerated in 1940.

forms of heart disease showed northern rates below southern rates, the greatest percentage difference (—38 percent) being apparent for the subgroup, other diseases of the heart, among males. Among

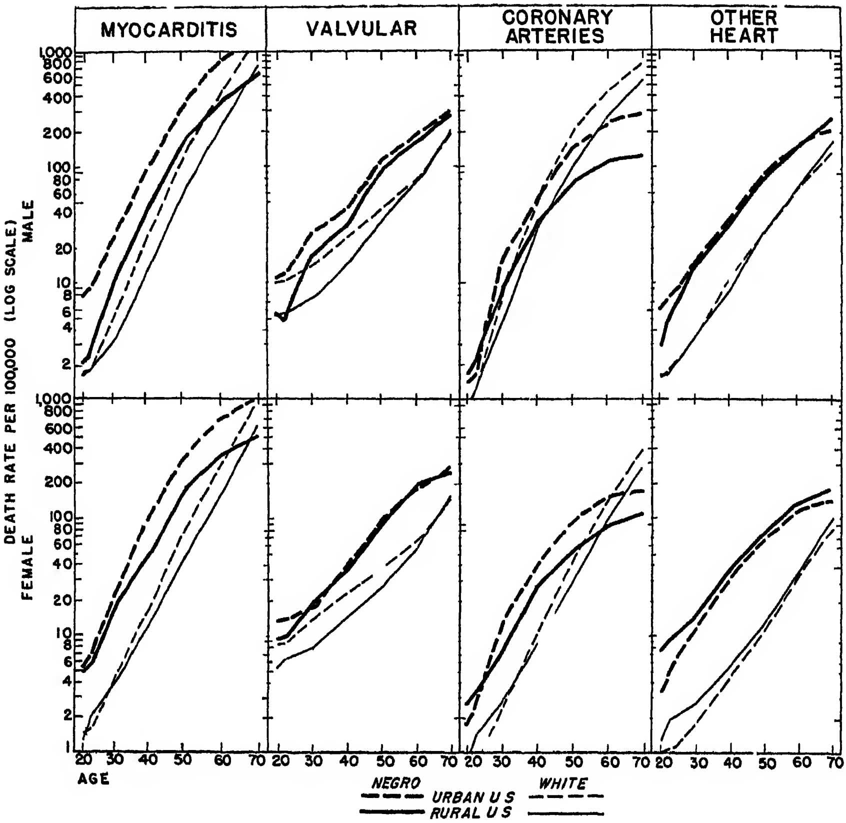


Figure 6. Age-specific mortality from four major forms of diseases of the heart among Negro and white males and females in urban and rural parts of the United States, 1940.

white persons mortality from all except the subgroup, other diseases of the heart, showed higher northern rates. Interchange of diagnosis is undoubtedly responsible for much of these differences; the same condition described as one form of heart disease in the North may be reported as another form in the South.

The three major specific forms--myocarditis, valvular heart disease, and diseases of the coronary arteries—all showed greater North-South mortality differences in rural than in urban areas. This would account for the difference in mortality from all forms of heart disease being greater in rural than in urban areas.

The subgroup, other diseases of the heart, was the only form with consistently higher rates in the South as compared with the North. This was observed also for white persons in rural and in urban areas (*13*).

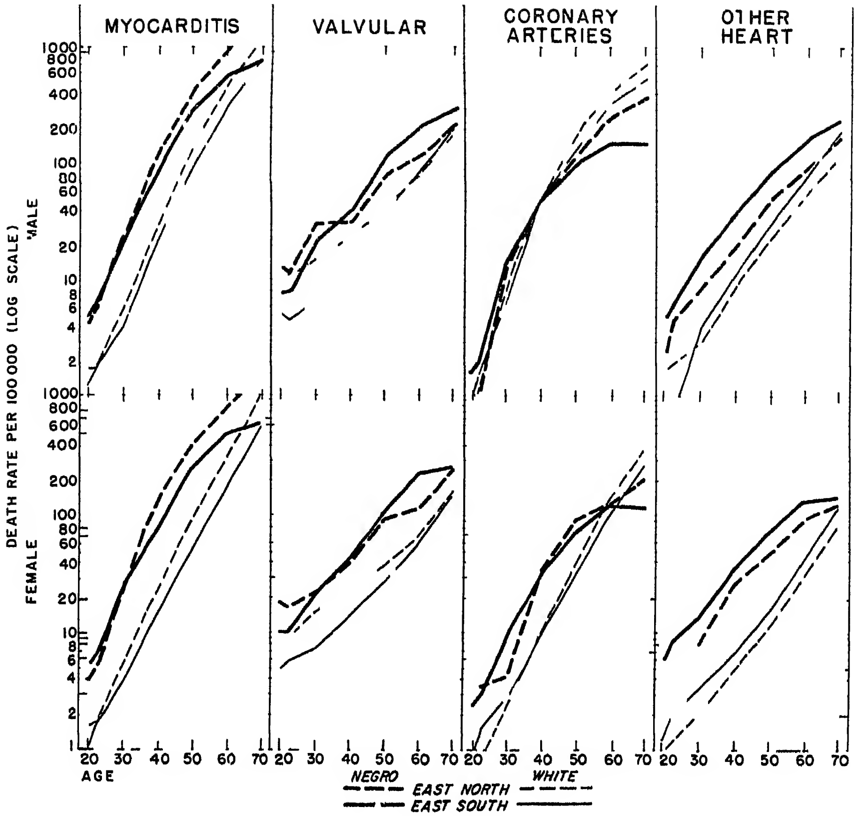


Figure 7. Age-specific mortality from four major forms of diseases of the heart among Negro and white males and females in North and South sections of the eastern United States, 1940.

## *Urban-Rural Differences*

Higher urban than rural mortality was observed for Negro males and females in the United States for four of the specific forms of diseases of the heart, the exception being the subgroup, other diseases of the heart (fig. 5). The urban rates for myocarditis mortality were about twice the rural rates for both sexes. Mortality from diseases of the coronary arteries showed almost as great an urban percentage excess; acute endocarditis among males, a greater urban percentage excess. For valvular heart disease the difference was slight. Again it must be remembered that interchange of diagnosis is a factor in these differences

Among Negroes in the East South region the urban death rates were markedly higher than the rural rates for the same three forms of heart disease—myocarditis, diseases of the coronary arteries, and acute endocarditis, with only a slight urban excess for valvular heart

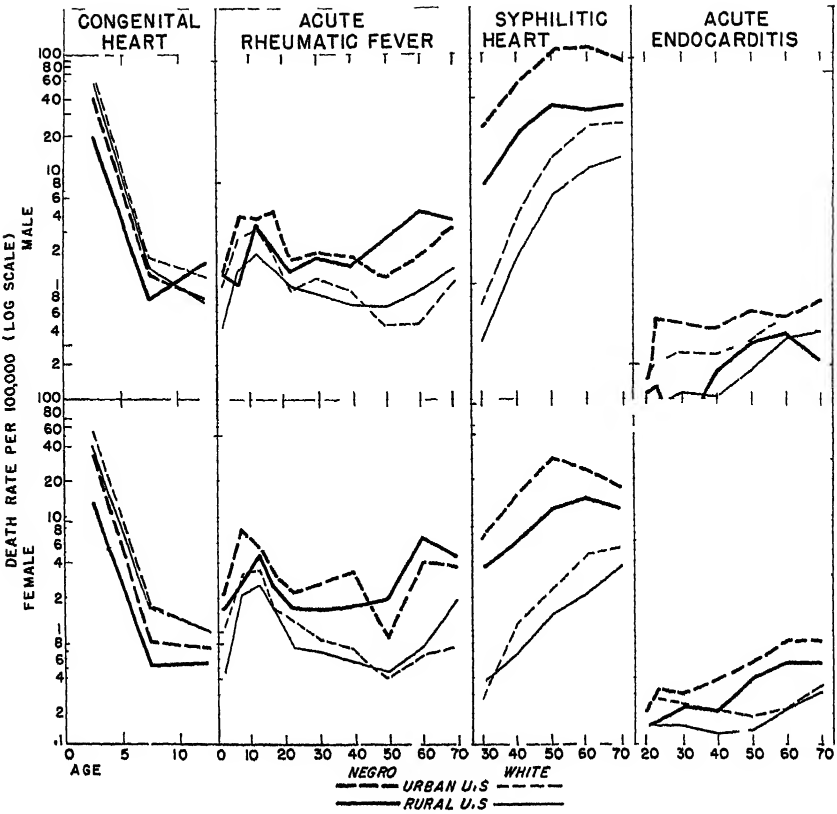


**Figure 8. Age-specific mortality from four minor forms of heart disease among Negro and white males and females in urban and rural parts of the United States, 1910.**

mortality. Only in the East North region were rural rates in excess of urban for all forms, as observed previously for total heart mortality.

### *Variation with Age*

Certain of the specific forms of heart disease are associated with different age periods of the life span. Congenital heart disease occurs mainly in persons under 5 years of age. In this age group it accounted for more than two-thirds of the total Negro deaths due to all forms of heart and related diseases. From 5 to 35 years, valvular heart disease is the prime cause of heart mortality and was responsible for one-fourth to one-half of the deaths from all forms. From 35 years on, it takes second place to diseases of the myocardium. The proportion of all heart disease deaths assigned to myocarditis increased from one-third at age 35 to two-thirds during the older ages.

Acute rheumatic fever appears as the second most important cause of Negro heart mortality in the young ages, 5–14 years. Diseases of the coronary arteries accounted for a relatively large part of the total

deaths (12 to 18 percent) in the age span 25–64 years; syphilitic heart disease, about the same proportion among males in the ages 25 54 years. Deaths from acute endocarditis are associated with young adulthood but did not exceed one-tenth of the total during those ages.

The subgroup, other forms of heart disease, accounted for 9 20 percent of the total Negro deaths from heart and related diseases at each age. Such a large proportion of unspecified deaths may obscure the true relative ranks of the seven specific forms.

Age-specific mortality rates for each of the eight forms of heart and related diseases for Negro males and females are given in appendix tables 2 and 3 and are illustrated in figures 6, 7, and 8 for selected age groups. These figures may be used to show the difference in shape of the mortality curves for the several specific forms, as well as the urban-rural and North-South differences. Mortality curves for white persons are shown also for Negro-white comparisons.

For the four major forms of diseases of the heart, the increases with age throughout the entire age span from 15 years onward for males and females are shown in figure 6. In the older ages, the increase is at a much slower rate, especially for diseases of the coronary arteries among Negroes. The fastest increases are observed for diseases of the myocardium; the slowest, for valvular and for other diseases of the heart.

The fifth division of diseases of the heart, acute endocarditis, presents a mortality curve that is different in shape relatively high at ages 20–34 years, with only a slow increase in later years (fig. 8). Congenital heart disease has its mortality peak in the youngest age group, with very rapid decline thereafter. Deaths from acute rheumatic fever have their highest rate at about ages 10 -14 years, followed by a decline and a rise again in the oldest ages. Syphilitic heart disease mortality shows a steady increase for males during young adulthood and the middle years, with some retardation during later ages.

The urban-rural relationships discussed previously for all ages combined are evident for specific age groups in figures 6 and 8. Urban mortality was higher than rural mortality for all except the subgroup, other diseases of the heart, for females.

The North-South mortality curves for the Eastern United States (fig. 7) are similar to the urban-rural curves for the total United States (fig. 6). The North and urban rates were higher than their corresponding South and rural rates for the specific age groups. The only differences between the two sets of curves were the slight reversals for valvular heart disease mortality after age 35 and the complete reversal for other heart disease among males.

The Negro mortality curves for six of the eight forms of heart disease were higher than the white curves for nearly every age group.

Deaths from diseases of the coronary arteries, however, showed higher rates among white males above age 35 and among white females above age 65. The other exception was congenital heart disease with higher white than Negro rates for both sexes.


## Summary

Negro mortality from diseases of the heart—total and for each of five specific forms—and from three closely related diseases is discussed in this study. Differences in mortality are related to region, population-size groups, sex and age, and comparisons are made with the corresponding mortality rates among white persons.

Negro heart mortality (all forms combined, age-adjusted) was higher (1) in the North than in the South section of the eastern United States, (2) in the urban than in rural parts of the United States, (3) in males than in females, and (4) in older than in younger ages. The North-South difference in heart mortality was due to the higher rates in the North for diseases of the myocardium and diseases of the coronary arteries. Higher urban than rural rates were observed for four of the five specific forms of diseases of the heart. The greatest sex differential was apparent for syphilitic heart disease, followed by diseases of the coronary arteries and congenital heart disease.

The association of mortality from specific forms of heart disease with different age periods of the life span was noted: congenital heart disease occurred mainly in persons under 5 years of age; valvular heart disease was the prime cause from 5 to 35 years; myocarditis led from 35 years on. Acute rheumatic fever was the second leading cause of heart mortality in the young ages, 5 to 14 years. Deaths from acute endocarditis were associated with young adulthood; syphilitic heart disease, with males aged 25 to 54; diseases of the coronary arteries, with the age span 25 to 64. Negro mortality curves for six of the eight forms were higher than the white curves for nearly every age group.



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Appendix table 1. *Nonwhite and white mortality from diseases of the heart (all forms) by sex and population-size groups in 28 States—resident age-adjusted [1] mortality per 100,000 population, 1940*

| Geographic section, State, and size of city | Population | | Nonwhite mortality | | | White mortality | | |
|---|---|---|---|---|---|---|---|---|
| | Nonwhite | White | Total | Male | Female | Total | Male | Female |
| NEW ENGLAND | | | | | | | | |
| Maine [2] | 2,683 | 814,513 | | | | | | |
| New Hampshire [2] | 535 | 490,989 | | | | | | |
| Vermont [2] | 425 | 358,806 | | | | | | |
| Massachusetts: | | | | | | | | |
| 100,000 and over | 40,358 | 1,613,920 | 120.5 | 480.2 | 366.9 | 385.0 | 400.5 | 325.3 |
| 2,500–100,000 | 11,780 | 2,193,418 | 309.3 | 390.1 | 223.7 | 317.3 | 380.0 | 267.1 |
| Rural | 6,987 | 450,258 | 390.1 | 408.1 | 292.5 | 339.2 | 403.5 | 279.5 |
| Rhode Island: | | | | | | | | |
| 100,000 and over | 6,600 | 246,904 | 583.1 | 710.4 | 459.7 | 357.1 | 427.0 | 301.0 |
| 2,500–100,000 | 4,042 | 395,837 | 633.8 | 585.1 | 682.6 | 338.3 | 389.9 | 295.2 |
| Rural | 899 | 59,064 | (3) | (3) | (3) | 320.9 | 371.1 | 271.1 |
| Connecticut: | | | | | | | | |
| 100,000 and over | 17,298 | 456,695 | 406.3 | 395.8 | 415.7 | 357.9 | 428.0 | 297.7 |
| 2,500–100,000 | 10,463 | 673,706 | 614.3 | 585.1 | 643.0 | 348.8 | 408.8 | 296.7 |
| Rural | 6,074 | 545,006 | 341.2 | 357.5 | 329.1 | 273.7 | 319.6 | 230.3 |
| MIDDLE ATLANTIC | | | | | | | | |
| New York: | | | | | | | | |
| 100,000 and over | 509,224 | 8,426,307 | 514.1 | 568.8 | 469.1 | 393.3 | 464.0 | 330.5 |
| 2,500–100,000 | 52,078 | 2,178,284 | 319.7 | 261.4 | 374.5 | 326.7 | 395.0 | 271.1 |
| Rural | [4] 38,291 | 2,274,955 | 680.2 | 718.1 | 633.8 | 353.6 | 403.2 | 302.3 |
| New Jersey: | | | | | | | | |
| 100,000 and over | 91,040 | 1,131,694 | 582.2 | 573.4 | 592.6 | 388.7 | 456.3 | 327.4 |
| 2,500–100,000 | 101,375 | 2,070,661 | 420.0 | 416.7 | 422.8 | 323.3 | 396.5 | 261.6 |
| Rural | 36,663 | 728,729 | 461.6 | 432.9 | 497.3 | 359.7 | 399.1 | 320.0 |
| Pennsylvania: | | | | | | | | |
| 100,000 and over | 319,249 | 2,651,671 | 498.8 | 516.0 | 482.4 | 381.3 | 454.3 | 319.7 |
| 2,500–100,000 | 99,802 | 3,516,155 | 412.7 | 452.4 | 369.4 | 325.0 | 401.5 | 260.1 |
| Rural | 54,140 | 3,259,163 | 575.4 | 500.4 | 596.8 | 321.6 | 362.9 | 283.1 |
| EAST NORTH CENTRAL | | | | | | | | |
| Ohio: | | | | | | | | |
| 100,000 and over | 242,699 | 2,411,313 | 436.1 | 456.9 | 415.1 | 311.5 | 370.1 | 259.9 |
| 2,500–100,000 | 60,780 | 1,898,194 | 415.6 | 405.2 | 364.8 | 268.8 | 324.0 | 222.7 |
| Rural | 37,602 | 2,257,024 | 445.3 | 462.8 | 419.7 | 258.1 | 296.6 | 215.4 |
| Indiana: | | | | | | | | |
| 100,000 and over | 77,829 | 640,540 | 371.7 | 379.0 | 364.9 | 313.7 | 390.8 | 246.5 |
| 2,500–100,000 | 36,879 | 1,132,404 | 424.2 | 380.9 | 473.0 | 291.9 | 352.3 | 238.1 |
| Rural | 7,765 | 1,532,319 | 393.1 | 394.9 | 390.1 | 239.0 | 271.5 | 203.4 |
| Illinois: | | | | | | | | |
| 100,000 and over | 285,129 | 3,216,766 | 673.6 | 764.1 | 594.6 | 392.6 | 481.8 | 309.9 |
| 2,500–100,000 | 77,240 | 2,230,515 | 352.0 | 417.5 | 286.4 | 296.4 | 357.4 | 243.8 |
| Rural | 30,670 | 2,056,921 | 496.3 | 544.1 | 435.1 | 268.0 | 299.0 | 233.5 |
| Michigan: | | | | | | | | |
| 100,000 and over | 160,200 | 1,779,087 | 578.1 | 575.9 | 580.3 | 322.9 | 387.8 | 261.3 |
| 2,500–100,000 | 37,554 | 1,478,026 | 326.5 | 392.8 | 258.1 | 297.0 | 357.8 | 242.4 |
| Rural | [4] 18,709 | 1,782,530 | 428.4 | 430.2 | 425.5 | 297.9 | 327.7 | 261.8 |
| Wisconsin [2] | 24,835 | 3,112,752 | | | | | | |

See footnotes at end of table.

Appendix table 1. *Nonwhite and white mortality from diseases of the heart (all forms) by sex and population-size groups in 28 States—resident age-adjusted*[1] *mortality per 100,000 population, 1940*—Continued

| Geographic section, State, and size of city | Population | | Nonwhite mortality | | | White mortality | | |
|---|---|---|---|---|---|---|---|---|
| | Nonwhite | White | Total | Male | Female | Total | Male | Female |
| SOUTH ATLANTIC | | | | | | | | |
| Delaware: | | | | | | | | |
| 100,000 and over | 14,329 | 98,175 | 585.1 | 689.6 | 487.6 | 291.6 | 350.2 | 243.2 |
| 2,500-100,000 | 4,139 | 22,789 | 562.6 | 543.3 | 585.1 | 251.7 | 300.0 | 211.6 |
| Rural | 17,509 | 109,564 | 497.9 | 368.4 | 672.8 | 294.1 | 330.2 | 256.6 |
| Maryland: | | | | | | | | |
| 100,000 and over | 166,395 | 692,705 | 511.9 | 553.0 | 474.3 | 377.3 | 460.5 | 311.4 |
| 2,500-100,000 | 21,236 | 200,015 | 585.1 | 596.8 | 573.8 | 317.3 | 397.0 | 251.9 |
| Rural | 115,132 | 625,761 | 362.3 | 379.1 | 342.4 | 301.7 | 351.5 | 252.5 |
| District of Columbia: | | | | | | | | |
| 100,000 and over | 188,765 | 474,326 | 521.5 | 573.1 | 479.7 | 293.3 | 406.7 | 210.5 |
| Virginia: | | | | | | | | |
| 100,000 and over | 107,420 | 229,954 | 460.3 | 505.9 | 422.3 | 307.8 | 390.1 | 245.4 |
| 2,500-100,000 | 133,960 | 473,341 | 402.4 | 463.6 | 351.1 | 315.1 | 436.6 | 216.6 |
| Rural | 420,810 | 1,312,288 | 364.8 | 397.6 | 328.4 | 246.7 | 287.0 | 204.4 |
| West Virginia: | | | | | | | | |
| 2,500-100,000 | 34,284 | 500,008 | 440.7 | 526.6 | 352.5 | 290.5 | 377.1 | 214.0 |
| Rural | 83,588 | 1,284,094 | 393.7 | 407.3 | 373.8 | 199.4 | 220.7 | 171.5 |
| North Carolina: | | | | | | | | |
| 100,000 and over | 31,424 | 69,475 | 338.1 | 446.5 | 258.8 | 334.0 | 477.3 | 217.3 |
| 2,500-100,000 | 268,163 | 605,113 | 374.0 | 454.2 | 311.9 | 284.5 | 390.0 | 200.8 |
| Rural | 704,401 | 1,893,047 | 252.9 | 266.4 | 238.9 | 210.3 | 258.3 | 170.6 |
| South Carolina: | | | | | | | | |
| 2,500-100,000 | 170,189 | 295,622 | 517.2 | 667.3 | 411.6 | 337.2 | 497.2 | 216.6 |
| Rural | 645,007 | 788,686 | 304.7 | 307.8 | 301.6 | 236.0 | 297.5 | 174.1 |
| Georgia: | | | | | | | | |
| 100,000 and over | 104,602 | 197,686 | 631.3 | 833.2 | 487.6 | 291.9 | 440.9 | 183.4 |
| 2,500-100,000 | 275,553 | 495,967 | 493.5 | 581.3 | 428.6 | 325.3 | 473.4 | 211.0 |
| Rural | 705,290 | 1,314,625 | 229.2 | 250.9 | 206.1 | 177.0 | 219.9 | 133.7 |
| Florida: | | | | | | | | |
| 100,000 and over | 122,146 | 331,482 | 412.0 | 493.8 | 338.0 | 262.7 | 348.7 | 180.9 |
| 2,500-100,000 | 165,322 | 426,841 | 361.6 | 418.6 | 277.4 | 256.1 | 341.9 | 176.3 |
| Rural | 227,960 | 623,663 | 254.3 | 276.8 | 225.7 | 191.8 | 232.1 | 150.3 |
| EAST SOUTH CENTRAL | | | | | | | | |
| Kentucky: | | | | | | | | |
| 100,000 and over | 47,210 | 271,867 | 693.1 | 828.9 | 576.7 | 348.3 | 450.3 | 270.0 |
| 2,500-100,000 | 69,661 | 460,589 | 390.0 | 410.2 | 345.3 | 300.3 | 370.3 | 244.0 |
| Rural | 97,331 | 1,898,969 | 308.5 | 316.8 | 298.7 | 195.1 | 216.8 | 170.7 |
| Tennessee: | | | | | | | | |
| 100,000 and over | 221,393 | 478,694 | 391.1 | 429.0 | 358.3 | 279.8 | 377.2 | 202.1 |
| 2,500-100,000 | 61,058 | 266,061 | 340.4 | 452.5 | 247.0 | 257.2 | 351.4 | 178.0 |
| Rural | 226,484 | 1,662,151 | 258.3 | 254.5 | 262.6 | 172.8 | 204.3 | 139.0 |
| Alabama: | | | | | | | | |
| 100,000 and over | 108,961 | 158,622 | 461.8 | 542.8 | 391.1 | 277.8 | 386.1 | 187.5 |
| 2,500-100,000 | 207,119 | 381,239 | 472.0 | 588.4 | 382.7 | 298.9 | 401.3 | 215.9 |
| Rural | 667,784 | 1,309,236 | 230.8 | 240.2 | 221.1 | 190.7 | 224.8 | 154.5 |
| Mississippi: | | | | | | | | |
| 2,500-100,000 | 178,314 | 254,538 | 293.3 | 330.3 | 258.7 | 284.7 | 386.6 | 203.3 |
| Rural | 890,125 | 851,789 | 206.3 | 211.8 | 200.3 | 198.5 | 231.8 | 155.2 |
| WEST SOUTH CENTRAL | | | | | | | | |
| Arkansas: | | | | | | | | |
| 2,500-100,000 | 105,140 | 326,770 | 411.7 | 472.6 | 357.3 | 276.1 | 370.5 | 191.6 |
| Rural | 378,163 | 1,139,314 | 149.5 | 150.9 | 147.9 | 139.2 | 162.9 | 111.0 |
| Louisiana: | | | | | | | | |
| 100,000 and over | 149,762 | 341,775 | 504.5 | 661.7 | 493.3 | 429.4 | 500.4 | 331.9 |
| 2,500-100,000 | 165,213 | 320,689 | 502.6 | 585.1 | 434.2 | 312.2 | 491.5 | 215.2 |
| Rural | 537,166 | 846,275 | 318.3 | 317.5 | 319.2 | 233.5 | 275.8 | 186.2 |
| Oklahoma[2] | 232,206 | 2,104,228 | ---- | ---- | ---- | ---- | ---- | ---- |
| Texas: | | | | | | | | |
| 100,000 and over | 182,192 | 928,572 | 501.1 | 579.6 | 430.6 | 298.7 | 405.6 | 207.5 |
| 2,500-100,000 | 239,628 | 1,560,997 | 348.5 | 370.6 | 328.4 | 266.1 | 349.9 | 190.2 |
| Rural | 505,459 | 2,997,976 | 207.7 | 207.9 | 207.4 | 172.4 | 205.4 | 134.2 |
| WEST NORTH CENTRAL | | | | | | | | |
| Minnesota[2] | 23,318 | 2,768,982 | ---- | ---- | ---- | ---- | ---- | ---- |
| Iowa: | | | | | | | | |
| 100,000 and over | 6,393 | 153,426 | 422.0 | 455.1 | 390.1 | 262.2 | 323.9 | 210.7 |
| 2,500-100,000 | 9,261 | 915,151 | 363.2 | 420.5 | 292.5 | 272.1 | 337.0 | 215.7 |
| Rural | [4] 1,923 | 1,452,114 | 633.8 | 658.2 | 585.1 | 190.8 | 218.5 | 160.3 |
| Missouri: | | | | | | | | |
| 100,000 and over | 151,086 | 1,064,140 | 476.0 | 497.2 | 456.6 | 297.0 | 378.6 | 220.2 |
| 2,500-100,000 | 40,781 | 704,689 | 379.9 | 418.5 | 341.3 | 272.6 | 352.9 | 205.4 |
| Rural | 53,610 | 1,770,358 | 234.7 | 197.0 | 284.6 | 193.9 | 226.5 | 157.2 |

See footnotes at end of table.

Appendix table 1. *Nonwhite and white mortality from diseases of the heart (all forms) by sex and population-size groups in 28 States—resident age-adjusted [1] mortality per 100,000 population, 1940*—Continued

| Geographic section, State, and size of city | Population | | Nonwhite mortality | | | White mortality | | |
|---|---|---|---|---|---|---|---|---|
| | Nonwhite | White | Total | Male | Female | Total | Male | Female |
| WEST NORTH CENTRAL—con. | | | | | | | | |
| North Dakota [2] | 10,171 | 631,161 | | --- | | --- | | --- |
| South Dakota [2] | 23,886 | 619,075 | | --- | | --- | --- | --- |
| Nebraska [2] | 18,210 | 1,297,621 | | --- | --- | --- | --- | --- |
| Kansas: | | | | | | | | |
| 100,000 and over | 26,848 | 209,576 | 391.1 | 452.1 | 345.1 | 241.9 | 322.3 | 168.9 |
| 2,500–100,000 | 25,871 | 491,616 | 322.1 | 383.5 | 259.3 | 269.5 | 347.3 | 203.8 |
| Rural | 13,813 | 1,033,274 | 395.8 | 419.3 | 362.2 | 196.0 | 229.5 | 158.0 |
| MOUNTAIN | | | | | | | | |
| 8 States [2] | 171,090 | 3,978,913 | --- | --- | --- | --- | --- | --- |
| PACIFIC | | | | | | | | |
| 3 States [2] | 362,621 | 9,370,641 | --- | --- | --- | --- | --- | --- |

[1] Adjusted for age by the indirect method to the total population of the United States enumerated 1940.
[2] Mortality rates omitted for States where less than 90 percent of the nonwhite population are Negro or there are less than 1,000 Negroes.
[3] Mortality rates omitted where there are less than 1,000 Negroes in population-size group.
[4] Less than 90 percent of the nonwhite population are Negro.

Appendix table 2. *Negro mortality from five specific forms of diseases of the heart, by sex, age, and urbanization, in the United States and in North and South sections of the eastern United States—resident mortality per 100,000 population, 1940*

| Age | Male | | | | | Female | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Diseases of the coronary arteries | Acute endocarditis | Chronic affections of the valves and endocardium | Diseases of the myocardium | Other diseases of the heart | Diseases of the coronary arteries | Acute endocarditis | Chronic affections of the valves and endocardium | Diseases of the myocardium | Other diseases of the heart |
| | Total United States | | | | | | | | | |
| All ages | 52.25 | 2.74 | 66.08 | 186.31 | 50.62 | 36.78 | 2.90 | 62.51 | 169.95 | 41.16 |
| Under 5 | | .48 | 2.41 | 1.77 | 3.38 | .61 | .48 | 2.07 | 1.75 | 3.83 |
| 5–9 | .16 | 1.55 | 5.13 | 1.86 | 2.80 | | .92 | 5.37 | .92 | 1.54 |
| 10–14 | .15 | .30 | 6.65 | 1.81 | 1.51 | .30 | .60 | 9.56 | 2.54 | 1.79 |
| 15–19 | 1.11 | .79 | 7.78 | 3.19 | 2.86 | 1.63 | 1.33 | 10.08 | 3.71 | 4.00 |
| 20–24 | 2.00 | 2.91 | 7.99 | 5.15 | 5.63 | 2.95 | 2.33 | 11.63 | 6.36 | 7.13 |
| 25–34 | 12.73 | 2.71 | 22.05 | 20.85 | 11.41 | 9.12 | 2.54 | 18.76 | 23.67 | 11.92 |
| 35–44 | 46.13 | 3.13 | 38.25 | 89.82 | 34.19 | 35.39 | 3.09 | 39.41 | 93.91 | 33.15 |
| 45–54 | 115.91 | 1.59 | 102.95 | 292.70 | 80.62 | 77.79 | 1.58 | 98.39 | 280.29 | 68.64 |
| 55–64 | 177.89 | 1.43 | 189.51 | 612.23 | 148.29 | 123.02 | 6.63 | 190.86 | 563.53 | 123.02 |
| 65–74 | 198.88 | 4.21 | 292.59 | 931.20 | 233.22 | 113.81 | 6.70 | 277.85 | 783.97 | 158.13 |
| 75 and over | 203.25 | 12.33 | 649.53 | 2,011.30 | 170.02 | 193.32 | 8.41 | 506.72 | 1,766.31 | 308.63 |
| | Urban United States—Cities and towns of 2,500 and over population | | | | | | | | | |
| All ages | 69.48 | 3.91 | 69.09 | 256.10 | 49.45 | 44.58 | 3.46 | 63.75 | 220.21 | 37.04 |
| Under 5 | --- | .87 | 3.03 | 3.04 | 3.91 | .43 | 1.29 | 4.29 | 4.29 | 5.58 |
| 5–9 | --- | 1.63 | 7.74 | 3.26 | 3.26 | --- | .40 | 8.31 | 1.19 | 1.19 |
| 10–14 | --- | .38 | 12.20 | 1.91 | 1.53 | .36 | 1.08 | 15.42 | 2.51 | 1.79 |
| 15–19 | 1.18 | .39 | 10.24 | 6.30 | 4.73 | 1.00 | 1.33 | 12.99 | 3.66 | 2.00 |
| 20–24 | 1.65 | 4.95 | 11.97 | 9.08 | 7.02 | 2.71 | 3.01 | 13.84 | 6.92 | 5.11 |
| 25–34 | 16.07 | 4.67 | 26.31 | 28.77 | 15.32 | 10.32 | 2.80 | 18.28 | 25.80 | 10.17 |
| 35–44 | 55.25 | 4.10 | 43.54 | 114.01 | 36.31 | 40.95 | 3.83 | 41.47 | 119.54 | 30.84 |
| 45–54 | 147.87 | 5.74 | 109.97 | 389.35 | 83.55 | 96.90 | 5.18 | 100.07 | 357.43 | 66.42 |
| 55–64 | 243.10 | 5.15 | 197.01 | 859.07 | 150.62 | 151.48 | 7.94 | 186.09 | 744.35 | 112.90 |
| 65–74 | 291.62 | 7.21 | 302.95 | 1,355.04 | 205.06 | 176.53 | 8.02 | 279.95 | 1,038.68 | 139.08 |
| 75 and over | 390.71 | 21.51 | 609.37 | 2,641.77 | 412.22 | 232.76 | 10.35 | 491.38 | 2,270.73 | 305.18 |

Appendix table 2. *Negro mortality from five specific forms of diseases of the heart, by sex, age, and urbanization, in the United States and in North and South sections of the eastern United States—resident mortality per 100,000 population, 1940*—Continued

| Age | Male | | | | | Female | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Diseases of the coronary arteries | Acute endocarditis | Chronic affections of the valves and endocardium | Diseases of the myocardium | Other diseases of the heart | Diseases of the coronary arteries | Acute endocarditis | Chronic affections of the valves and endocardium | Diseases of the myocardium | Other diseases of the heart |
| **Rural United States—Towns of less than 2,500 population and rural areas** | | | | | | | | | | |
| All ages | 35.90 | 1.60 | 61.87 | 124.66 | 50.83 | 27.52 | 2.26 | 61.53 | 114.02 | 45.64 |
| Under 5 | ---- | .26 | 2.04 | 1.02 | 3.07 | .76 | ---- | .76 | .25 | 2.79 |
| 5-9 | .25 | 1.51 | 3.51 | 1.00 | 2.51 | ---- | 1.26 | 3.52 | .75 | 1.76 |
| 10-14 | .25 | .25 | 3.01 | 1.75 | 1.50 | .26 | .26 | 5.38 | 2.56 | 1.79 |
| 15-19 | 1.06 | 1.06 | 6.11 | 1.60 | 1.60 | 2.14 | 1.34 | 8.82 | 3.74 | 5.61 |
| 20-24 | 2.27 | 1.30 | 4.87 | 2.60 | 4.55 | 3.20 | 1.60 | 9.28 | 5.76 | 9.28 |
| 25-34 | 8.87 | .43 | 17.08 | 11.68 | 13.41 | 7.35 | 2.16 | 19.47 | 20.55 | 14.49 |
| 35-44 | 32.80 | 1.71 | 30.52 | 54.48 | 31.09 | 26.63 | 1.92 | 36.24 | 53.54 | 36.79 |
| 45-54 | 76.65 | 3.18 | 94.32 | 173.79 | 77.01 | 52.63 | 3.79 | 96.17 | 178.72 | 71.56 |
| 55-64 | 116.67 | 3.75 | 182.40 | 381.58 | 146.10 | 90.73 | 5.15 | 196.27 | 358.43 | 134.49 |
| 65-74 | 134.03 | 2.16 | 285.34 | 634.82 | 252.92 | 111.01 | 5.37 | 275.74 | 528.21 | 177.26 |
| 75 and over | 232.93 | 6.66 | 674.39 | 1,626.07 | 505.79 | 159.14 | 6.72 | 520.01 | 1,329.15 | 423.62 |
| **Total North [1]** | | | | | | | | | | |
| All ages | 73.53 | 2.49 | 57.78 | 306.35 | 31.84 | 44.09 | 2.79 | 59.17 | 277.70 | 33.46 |
| Under 5 | ---- | 1.12 | 4.48 | 1.12 | 3.30 | ---- | 1.11 | 7.79 | ---- | 5.56 |
| 5-9 | ---- | 2.09 | 9.41 | 4.18 | 1.05 | ---- | ---- | 10.30 | 3.09 | 1.03 |
| 10-14 | ---- | ---- | 13.55 | 1.94 | 1.94 | .93 | 1.86 | 26.97 | 3.72 | 1.86 |
| 15-19 | ---- | ---- | 15.35 | 3.07 | 1.02 | ---- | 1.87 | 19.59 | 2.80 | 5.60 |
| 20-24 | 1.13 | 6.81 | 11.34 | 5.67 | 4.54 | 3.50 | 3.50 | 16.61 | 5.25 | ---- |
| 25-34 | 12.31 | 1.48 | 31.02 | 22.16 | 8.37 | 4.38 | 1.20 | 21.52 | 23.91 | 8.37 |
| 35-44 | 47.98 | 2.67 | 31.99 | 116.40 | 21.33 | 34.42 | 3.01 | 38.72 | 136.38 | 26.24 |
| 45-54 | 137.73 | 4.57 | 82.25 | 387.74 | 53.53 | 93.19 | 2.87 | 93.18 | 400.70 | 48.74 |
| 55-64 | 240.87 | 1.31 | 121.74 | 904.56 | 98.18 | 128.35 | 8.56 | 118.37 | 817.18 | 98.40 |
| 65-74 | 365.64 | ---- | 231.66 | 1,808.64 | 189.80 | 215.75 | 5.20 | 259.93 | 1,492.03 | 129.97 |
| 75 and over | 572.25 | 19.07 | 639.01 | 3,948.50 | 305.20 | 320.75 | 7.46 | 499.78 | 3,408.92 | 365.51 |
| **Urban North [1]—Cities and towns of 2,500 and over population** | | | | | | | | | | |
| All ages | 70.94 | 2.73 | 56.05 | 297.80 | 34.27 | 44.00 | 2.49 | 57.43 | 271.60 | 32.56 |
| Under 5 | ---- | 1.24 | 3.73 | 1.24 | 2.49 | ---- | 1.23 | 8.62 | ---- | 6.16 |
| 5-9 | ---- | 1.16 | 10.15 | 4.64 | 1.16 | ---- | ---- | 11.41 | 1.14 | 1.14 |
| 10-14 | ---- | ---- | 15.22 | 2.17 | 2.17 | 1.03 | 2.06 | 28.85 | 3.09 | 2.06 |
| 15-19 | ---- | ---- | 16.36 | 2.34 | 1.17 | ---- | 2.07 | 19.67 | 2.07 | 5.18 |
| 20-24 | 1.29 | 7.71 | 12.85 | 6.43 | 5.14 | 2.84 | 3.78 | 17.03 | 4.73 | ---- |
| 25-34 | 12.47 | 1.63 | 31.45 | 22.23 | 8.68 | 4.68 | 1.28 | 19.59 | 23.42 | 7.67 |
| 35-44 | 46.63 | 2.91 | 32.06 | 117.07 | 22.23 | 34.99 | 2.30 | 38.08 | 137.21 | 25.32 |
| 45-54 | 140.96 | 5.09 | 78.47 | 400.37 | 56.68 | 94.27 | 3.12 | 90.37 | 398.88 | 45.19 |
| 55-64 | 234.84 | 1.50 | 119.66 | 903.45 | 98.72 | 128.05 | 7.90 | 115.40 | 820.48 | 91.60 |
| 65-74 | 333.40 | ---- | 217.92 | 1,730.17 | 178.30 | 208.07 | 2.89 | 257.19 | 1,453.59 | 127.15 |
| 75 and over | 533.30 | 23.70 | 502.56 | 3,638.30 | 272.58 | 325.62 | ---- | 415.59 | 3,359.04 | 385.60 |
| **Rural North [1]—Towns of less than 2,500 population and rural areas** | | | | | | | | | | |
| All ages | 86.94 | .84 | 66.41 | 338.55 | 34.82 | 44.19 | 5.40 | 74.83 | 303.80 | 45.01 |
| Under 5 | ---- | ---- | 11.23 | ---- | 11.23 | ---- | ---- | ---- | ---- | ---- |
| 5-9 | ---- | 10.52 | ---- | ---- | ---- | ---- | ---- | ---- | 21.27 | ---- |
| 10-14 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 9.55 | 9.55 | ---- |
| 15-19 | ---- | ---- | 8.23 | 8.23 | ---- | ---- | ---- | 18.87 | 9.44 | 9.44 |
| 20-24 | ---- | ---- | ---- | ---- | ---- | 11.51 | ---- | 11.51 | 11.51 | ---- |
| 25-34 | 10.69 | ---- | 26.73 | 21.39 | 5.35 | ---- | ---- | 49.61 | 31.01 | 18.60 |
| 35-44 | 62.42 | ---- | 31.20 | 109.23 | 10.40 | 26.22 | 13.11 | 39.32 | 124.52 | 30.32 |
| 45-54 | 109.18 | ---- | 115.60 | 276.15 | 25.69 | 80.73 | ---- | 125.58 | 421.60 | 89.70 |
| 55-64 | 283.14 | ---- | 136.32 | 912.33 | 94.38 | 131.14 | 14.57 | 145.70 | 786.83 | 160.28 |
| 65-74 | 541.32 | ---- | 306.75 | 2,237.46 | 252.62 | 284.46 | 25.86 | 284.46 | 1,836.05 | 155.16 |
| 75 and over | 732.78 | ---- | 830.48 | 5,227.16 | 439.67 | 288.02 | 57.60 | 864.06 | 3,744.24 | 230.41 |

See footnotes at end of table.

Appendix table 2. *Negro mortality from five specific forms of diseases of the heart, by sex, age, and urbanization, in the United States and in North and South section of the eastern United States—resident mortality per 100,000 population, 1940*—Continued

| Age | Male: Diseases of the coronary arteries | Male: Acute endocarditis | Male: Chronic affections of the valves and endocardium | Male: Diseases of the myocardium | Male: Other diseases of the heart | Female: Diseases of the coronary arteries | Female: Acute endocarditis | Female: Chronic affections of the valves and endocardium | Female: Diseases of the myocardium | Female: Other diseases of the heart |
|---|---|---|---|---|---|---|---|---|---|---|
| | **Total South [2]** | | | | | | | | | |
| All ages | 46.32 | 2.77 | 71.94 | 162.42 | 56.38 | 33.59 | 2.72 | 65.66 | 141.31 | 44.41 |
| Under 5 | - | .51 | 1.77 | 1.78 | 3.55 | .75 | .25 | .75 | 1.25 | 3.76 |
| 5–9 | - | 1.18 | 3.46 | 1.98 | 3.46 | - | 1.22 | 5.13 | .49 | 2.20 |
| 10–14 | - | .49 | 5.83 | 1.94 | 1.21 | - | .24 | 6.52 | 1.93 | 1.93 |
| 15–19 | 1.27 | 1.02 | 7.39 | 3.82 | 3.06 | 1.91 | 1.44 | 9.81 | 4.31 | 3.35 |
| 20–24 | 2.05 | 2.64 | 7.91 | 5.86 | 6.73 | 3.07 | 2.56 | 9.74 | 6.66 | 8.71 |
| 25–34 | 13.10 | 3.01 | 21.95 | 21.42 | 16.82 | 10.04 | 2.87 | 20.56 | 25.34 | 13.55 |
| 35–44 | 45.86 | 3.67 | 10.82 | 84.38 | 41.27 | 31.97 | 3.48 | 41.20 | 78.09 | 37.71 |
| 45–54 | 110.99 | 4.64 | 120.88 | 280.10 | 89.96 | 72.70 | 5.78 | 105.85 | 248.82 | 76.35 |
| 55–64 | 158.26 | 4.61 | 219.21 | 548.01 | 172.60 | 120.86 | 4.39 | 229.08 | 491.14 | 140.09 |
| 65–74 | 152.42 | 2.90 | 305.55 | 704.08 | 246.77 | 116.22 | 2.34 | 268.32 | 614.62 | 155.22 |
| 75 and over | 216.48 | 9.31 | 684.31 | 1582.83 | 495.80 | 154.50 | 6.10 | 494.00 | 1321.41 | 372.03 |
| | **Urban South [2]—Cities and towns of 2,500 and over population** | | | | | | | | | |
| All ages | 68.91 | 4.58 | 82.78 | 243.07 | 58.69 | 44.50 | 1.08 | 70.54 | 190.12 | 39.61 |
| Under 5 | - | .97 | 1.91 | 4.86 | 3.89 | .96 | .96 | .96 | 4.78 | 4.78 |
| 5–9 | - | 1.82 | 3.65 | 3.65 | 5.47 | | .88 | 8.80 | .88 | 1.76 |
| 10–14 | - | .86 | 13.75 | 1.72 | .86 | - | - | 7.20 | - | .80 |
| 15–19 | 2.62 | - | 8.72 | 9.60 | 7.85 | .71 | 1.42 | 8.96 | 5.69 | - |
| 20–24 | 1.74 | 4.36 | 13.08 | 11.33 | 7.85 | 2.53 | 3.16 | 10.11 | 8.22 | 7.58 |
| 25–34 | 17.76 | 6.34 | 26.64 | 33.83 | 19.87 | 12.79 | 3.37 | 20.87 | 30.30 | 11.11 |
| 35–44 | 61.50 | 5.05 | 52.51 | 121.67 | 46.95 | 39.14 | 5.59 | 15.15 | 107.09 | 36.13 |
| 45–54 | 167.16 | 6.81 | 151.27 | 401.63 | 99.84 | 104.49 | 8.47 | 115.09 | 341.01 | 75.55 |
| 55–64 | 240.53 | 6.01 | 264.58 | 882.43 | 189.41 | 164.38 | 8.29 | 256.92 | 721.04 | 132.61 |
| 65–74 | 251.99 | 7.20 | 331.19 | 1199.96 | 225.59 | 158.99 | 6.04 | 289.80 | 800.97 | 134.84 |
| 75 and over | 291.37 | 25.71 | 617.02 | 2073.87 | 437.06 | 169.11 | 11.66 | 466.50 | 1580.27 | 268.24 |
| | **Rural South [2]—Towns of less than 2,500 population and rural areas** | | | | | | | | | |
| All ages | 33.27 | 1.70 | 65.09 | 119.48 | 54.44 | 25.75 | 1.72 | 62.26 | 107.79 | 47.41 |
| Under 5 | - | .34 | 1.72 | .69 | 3.43 | .68 | - | .68 | - | 3.40 |
| 5–9 | - | 1.35 | 3.39 | 1.35 | 2.71 | - | 1.35 | 3.72 | .34 | 2.37 |
| 10–14 | | .31 | 2.71 | 2.03 | 1.35 | | .35 | 6.23 | 2.77 | 2.42 |
| 15–19 | .72 | 1.41 | 6.84 | 1.44 | 1.08 | 2.52 | 1.44 | 9.74 | 3.60 | 5.05 |
| 20–24 | 2.20 | 1.76 | 5.29 | 3.09 | 6.17 | 3.45 | 2.15 | 9.48 | 5.60 | 9.48 |
| 25–34 | 9.71 | .61 | 18.58 | 12.48 | 11.61 | 7.57 | 2.42 | 20.27 | 20.88 | 15.74 |
| 35–44 | 32.77 | 2.52 | 31.08 | 53.35 | 30.55 | 25.45 | 1.57 | 37.59 | 51.69 | 39.16 |
| 45–54 | 72.16 | 3.14 | 99.87 | 196.60 | 83.14 | 48.63 | 3.74 | 98.88 | 179.04 | 76.96 |
| 55–64 | 115.75 | 3.88 | 195.75 | 375.20 | 163.91 | 92.13 | 1.82 | 210.71 | 339.32 | 145.03 |
| 65–74 | 100.25 | 1.04 | 294.45 | 576.40 | 255.95 | 89.15 | | 254.72 | 496.70 | 168.11 |
| 75 and over | 188.55 | 3.20 | 709.45 | 1399.72 | 517.70 | 146.69 | 3.12 | 508.73 | 1182.86 | 427.58 |

NOTE.—White mortality rates are given in appendix table 2 of reference (*13*).
[1] North: New England, Middle Atlantic, and East North Central regions.
[2] South: South Atlantic and East South Central regions.

**Appendix table 3.** *Negro mortality from acute rheumatic fever, syphilitic heart disease, and congenital heart disease by sex, age, and urbanization in the United States—resident mortality per 100,000 population, 1940*

| Age | Male: Acute rheumatic fever | Male: Syphilitic heart disease | Male: Congenital heart disease | Female: Acute rheumatic fever | Female: Syphilitic heart disease | Female: Congenital heart disease |
|---|---|---|---|---|---|---|
| | **Total United States** | | | | | |
| All ages | 2.37 | 26.06 | 2.68 | 3.09 | 8.02 | 2.00 |
| Under 5 | 1.20 | ---- | 28.95 | 1.75 | ---- | 22.00 |
| 5–9 | 2.17 | ---- | .93 | 4.61 | ---- | .61 |
| 10–14 | 3.63 | .30 | 1.21 | 4.93 | .15 | .60 |
| 15–19 | 3.01 | .16 | .48 | 2.67 | 1.48 | .30 |
| 20–24 | 1.46 | 2.36 | .55 | 1.86 | 2.17 | .47 |
| 25–34 | 1.80 | 16.04 | .10 | 2.10 | 5.26 | .18 |
| 35–44 | 1.63 | 42.65 | .12 | 2.66 | 11.62 | ---- |
| 45–54 | 1.75 | 71.59 | .48 | 1.31 | 22.55 | .33 |
| 55–64 | 3.04 | 68.89 | ---- | 5.13 | 19.60 | ---- |
| 65–74 | 3.39 | 55.97 | ---- | 1.02 | 14.74 | ---- |
| 75 and over | 10.96 | 30.15 | ---- | 12.01 | 13.21 | ---- |
| | **Urban United States—Cities and towns of 2,500 and over population** | | | | | |
| All ages | 2.30 | 38.06 | 3.95 | 3.39 | 10.48 | 3.22 |
| Under 5 | 1.30 | ---- | 44.28 | 2.15 | ---- | 36.50 |
| 5–9 | 4.07 | ---- | 1.22 | 7.92 | ---- | .79 |
| 10–14 | 3.81 | .38 | .76 | 5.38 | ---- | .72 |
| 15–19 | 4.33 | ---- | .39 | 3.00 | 1.67 | ---- |
| 20–24 | 1.65 | 4.13 | .83 | 2.11 | 1.80 | .60 |
| 25–34 | 1.87 | 23.54 | .10 | 2.51 | 6.49 | .29 |
| 35–44 | 1.76 | 57.59 | .20 | 3.31 | 15.16 | ---- |
| 45–54 | 1.15 | 101.93 | .57 | .86 | 31.06 | .58 |
| 55–64 | 1.72 | 108.82 | ---- | 3.97 | 24.40 | ---- |
| 65–74 | 3.09 | 85.53 | ---- | 3.57 | 17.83 | ---- |
| 75 and over | ---- | 46.60 | ---- | 7.70 | 25.86 | ---- |
| | **Rural United States—Towns of less than 2,500 population and rural areas** | | | | | |
| All ages | 2.45 | 12.90 | 1.91 | 2.85 | 4.85 | 1.24 |
| Under 5 | 1.28 | ---- | 19.93 | 1.52 | ---- | 13.43 |
| 5–9 | 1.00 | ---- | .75 | 2.51 | ---- | .50 |
| 10–14 | 3.50 | .25 | 1.50 | 4.87 | .26 | .51 |
| 15–19 | 2.13 | .27 | .53 | 2.40 | 1.34 | .53 |
| 20–24 | 1.30 | .97 | .32 | 1.60 | 2.56 | .32 |
| 25–34 | 1.74 | 7.35 | ---- | 1.52 | 3.40 | ---- |
| 35–44 | 1.43 | 20.82 | ---- | 1.64 | 6.04 | ---- |
| 45–54 | 2.47 | 34.26 | .35 | 1.90 | 11.36 | ---- |
| 55–64 | 4.28 | 31.57 | ---- | 6.43 | 14.16 | ---- |
| 65–74 | 3.60 | 35.31 | ---- | 4.48 | 11.61 | ---- |
| 75 and over | 17.75 | 19.97 | ---- | 15.69 | 2.24 | ---- |

NOTE.—White mortality rates are given in appendix table 2 of reference *(13)*.

# Incidence of Disease

*No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring*

## UNITED STATES

### Reports From States for Week Ended December 30, 1950

During 1950 the incidence of the communicable diseases reported weekly by States was generally favorable in comparison with 1949 or the 5-year (1945-49) median.

Three diseases for which intensive preventive or public health measures are available and are widely used, namely diphtheria, smallpox, and the typhoid-paratyphoid group, were reported in smaller numbers in 1950 as compared with 1949 and the 5-year median. However, whooping cough, a disease against which immunization is extensively used, was reported in larger numbers. The total number of cases of diphtheria, 6,535, smallpox, 34, and typhoid and paratyphoid fever, 3,424, for the 52 weeks ended December 30, 1950, were gratifyingly low when compared with some previous years. In 1930, totals of 66,526 cases of diphtheria, 48,907 cases of smallpox, and 27,201 cases of typhoid and paratyphoid fever were reported.

*Comparative Data for Cases of Specified Reportable Diseases: United States*

[Numbers after diseases are International List numbers, 1948 revision]

| Disease | Total for week ended | | 5-year median 1945-49 | Seasonal low week | Cumulative total since seasonal low week | | 5-year median 1944-45 through 1948-49 | Cumulative total for calendar year | | 5-year median 1945-49 |
|---|---|---|---|---|---|---|---|---|---|---|
| | Dec. 30, 1950 | Dec. 31, 1949 | | | 1949-50 | 1948-49 | | 1950 | 1949 | |
| Anthrax (062) | | 1 | (1) | (1) | (1) | (1) | (1) | 15 | 53 | (1) |
| Diphtheria (055) | 113 | 158 | 211 | 27th | 2,907 | 4,271 | 6,214 | 6,535 | 8,039 | 12,511 |
| Acute infectious encephalitis (082) | 15 | 11 | 5 | (1) | (1) | (1) | (1) | 1,009 | 761 | 620 |
| Influenza (480-483) | 3,032 | 2,020 | 2,821 | 30th | 38,407 | 30,530 | 30,270 | 281,666 | 106,397 | 223,172 |
| Measles (085) | 1,101 | 2,778 | 2,778 | 35th | 28,089 | 19,130 | 20,124 | 316,860 | 607,048 | 604,027 |
| Meningococcal meningitis (057.0) | 78 | 69 | 69 | 37th | 961 | 913 | 913 | 3,760 | 3,429 | 3,429 |
| Pneumonia (490-493) | 1,306 | 1,701 | | (1) | (1) | (1) | (1) | [2]79,942 | 77,691 | ------ |
| Acute poliomyelitis (080) | 238 | 195 | 108 | 11th | [2]32,213 | 11,453 | 24,797 | [2]33,344 | 42,366 | 25,264 |
| Rocky Mountain spotted fever (104) | 1 | - | - | (1) | (1) | (1) | (1) | 459 | 560 | 560 |
| Scarlet fever (050) | 1,452 | 1,214 | 1,873 | 32d | 15,654 | 16,439 | 22,544 | 55,824 | 74,105 | 83,300 |
| Smallpox (084) | - | --- | 1 | 35th | 8 | 7 | 22 | 34 | 48 | 169 |
| Tularemia (059) | 19 | 32 | 32 | (1) | (1) | (1) | (1) | 897 | 1,138 | 1,138 |
| Typhoid and paratyphoid fever (040, 041) [3] | 29 | 29 | 39 | 11th | [4]2,915 | 3,373 | 3,409 | [4]3,424 | 3,861 | 3,894 |
| Whooping cough (056) | 1,387 | 1,470 | 1,470 | 39th | 21,602 | 21,536 | 24,337 | 118,797 | 68,138 | 100,212 |

[1] Not computed.
[2] Additions: Pneumonia, Indiana, week ended December 16, 7 cases; poliomyelitis, Nebraska, 14 delayed cases.
[3] Including cases reported as salmonellosis.
[4] Deduction: New Hampshire, week ended Nov. 25, 1 case.

In 1940, the totals were 15,536, 2,795, and 9,809, respectively, for the three diseases. Whooping cough has shown no comparable decrease in numbers, 166,914 cases being reported in 1930, 183,866 in 1940, and 118,797 in 52 weeks of 1950.

Measles, poliomyelitis, Rocky Mountain spotted fever, scarlet fever, and tularemia were reported in fewer numbers in 1950 as compared with 1949.

The total number of influenza cases in 1950 was greater than in 1949 because of epidemic prevalence in many parts of the country in 1950. Infectious encephalitis, meningococcal meningitis, pneumonia, and rabies in animals were reported in slightly greater numbers in 1950 as compared with 1949.

## Report of Epidemics

*Upper respiratory diseases—cause undetermined*

Dr. Carl C. Kuehn, Director, Division of Preventive Medicine, Louisiana State Department of Health, reports that an epidemic of an undiagnosed febrile disease occurred late in November 1950 in the vicinity of Ruston, La. He estimated that there were two to three hundred cases of an upper respiratory infection which were manifested by fever, headache, irritability, and splenic and hepatic enlargement which were associated with abdominal pain. There was also a generalized lymphadenopathy and sore throat. A few cases had a measles-like rash, and an occasional patient had vesicular lesions. The average white count was between 15,000 and 20,000 leucocytes.

An investigation is being conducted to determine the cause of this outbreak.

## *Deaths During Week Ended Dec. 30, 1950*

| | *Week ended Dec. 30, 1950* | *Corresponding week, 1949* |
|---|---|---|
| Data for 93 large cities of the United States: | | |
| Total deaths | 9, 891 | 10, 028 |
| Median for 3 prior years | 10, 439 | |
| Total deaths for 1950 | 476, 646 | 476, 920 |
| Deaths under 1 year of age | 585 | 649 |
| Median for 3 prior years | 724 | |
| Deaths under 1 year of age, for 1950 | 32, 256 | 33, 699 |
| Data from industrial insurance companies: | | |
| Policies in force | 69, 564, 916 | 69, 878, 197 |
| Number of death claims | 11, 762 | 9, 543 |
| Death claims per 1,000 policies in force, annual rate | 8. 8 | 7. 1 |
| Death claims per 1,000 policies for 1950 | 9. 2 | 9. 1 |

## Reported Cases of Selected Communicable Diseases: United States, Week Ended Dec. 30, 1950

[Numbers under diseases are International List numbers, 1948 revision]

| Area | Diphtheria (055) | Encephalitis, infectious (082) | Influenza (480–483) | Measles (085) | Meningitis, meningococcal (057.0) | Pneumonia (490–493) | Poliomyelitis (080) |
|---|---|---|---|---|---|---|---|
| **United States** | 113 | 15 | 3,632 | 4,101 | 78 | 1,306 | 238 |
| **New England** | 4 | 1 | 3 | 181 | 5 | 42 | 14 |
| Maine |  |  |  | 1 | 1 | 15 |  |
| New Hampshire |  |  |  | 2 |  |  |  |
| Vermont |  |  |  | 108 |  |  |  |
| Massachusetts | 4 | 1 |  | 63 | 2 |  | 7 |
| Rhode Island |  |  | 1 | 2 | 1 | 2 |  |
| Connecticut |  |  | 2 | 7 | 1 | 25 | 7 |
| **Middle Atlantic** | 12 | 2 | 3 | 604 | 16 | 221 | 34 |
| New York | 7 | 1 | [1] 1 | 196 | 12 | 163 | 26 |
| New Jersey | 2 | 1 | 2 | 112 |  | 32 | 4 |
| Pennsylvania | 3 |  |  | 296 | 4 | 26 | 4 |
| **East North Central** | 15 | 1 | 118 | 1,371 | 16 | 134 | 41 |
| Ohio | 8 |  | 4 | 540 | 6 |  | 19 |
| Indiana | 5 | 1 | 66 | 36 |  | 18 | 6 |
| Illinois | 2 |  | 4 | 357 | 3 | 66 | 2 |
| Michigan |  |  |  | 118 | 3 | 40 | 8 |
| Wisconsin |  |  | 44 | 320 | 4 | 10 | 6 |
| **West North Central** | 6 | 1 | 9 | 285 | 3 | 83 | 10 |
| Minnesota | 2 |  |  | 22 |  | 19 | 1 |
| Iowa |  |  |  | 2 | 1 | 4 | 1 |
| Missouri | 2 |  | 5 | 140 | 1 | 21 | 3 |
| North Dakota |  |  | 4 | 3 |  | 19 |  |
| South Dakota |  | 1 |  | 3 |  |  |  |
| Nebraska | 1 |  |  |  |  |  | 1 |
| Kansas | 1 |  |  | 115 | 1 | 20 | 1 |
| **South Atlantic** | 27 | 1 | 439 | 213 | 8 | 195 | 26 |
| Delaware |  |  |  | 5 |  |  |  |
| Maryland |  |  | 2 | 5 | 3 | 18 | 5 |
| District of Columbia |  | 1 | 2 | 9 |  | 22 |  |
| Virginia | 8 |  | 271 | 108 | 2 | 95 | 3 |
| West Virginia | 2 |  | 34 | 5 |  | 9 | 1 |
| North Carolina | 6 |  |  | 39 |  |  | 3 |
| South Carolina | 4 |  | 80 | 4 |  | 10 | 1 |
| Georgia | 3 |  | 42 | 37 | 1 | 21 | 1 |
| Florida | 4 |  | 5 | 1 | 2 | 20 | 12 |
| **East South Central** | 11 | 1 | 92 | 150 | 10 | 68 | 13 |
| Kentucky | 2 |  |  | 60 | 3 | 13 | 4 |
| Tennessee | 3 |  | 30 | 40 | 6 |  | 5 |
| Alabama | 3 |  | 54 |  | 1 | 26 | 3 |
| Mississippi | 3 | 1 | 8 | 50 |  | 29 | 1 |
| **West South Central** | 31 | 2 | 2,700 | 488 | 9 | 453 | 20 |
| Arkansas | 8 | 1 | 219 | 74 | 1 | 56 | 4 |
| Louisiana | 2 |  |  | 78 | 1 | 19 | 8 |
| Oklahoma | 6 | 1 | 104 | 50 | 1 | 9 |  |
| Texas | 15 |  | 2,377 | 286 | 6 | 369 | 8 |
| **Mountain** | 5 | 1 | 244 | 370 | 2 | 52 | 14 |
| Montana |  |  | 20 |  |  |  |  |
| Idaho |  |  | 2 | 19 |  | 5 |  |
| Wyoming |  |  |  | 101 |  |  | 1 |
| Colorado | 1 | 1 | 27 | 202 |  | 25 | 5 |
| New Mexico | 1 |  |  | 2 |  | 2 | 6 |
| Arizona |  |  | 195 | 23 | 1 | 20 | 1 |
| Utah | 3 |  |  | 23 | 1 |  | 1 |
| Nevada |  |  |  |  |  |  |  |
| **Pacific** | 2 | 5 | 24 | 439 | 9 | 58 | 66 |
| Washington |  |  |  | 178 | 4 | 5 | 12 |
| Oregon | 1 |  | 13 | 21 | 1 | 23 | 6 |
| California | 1 | 5 | 11 | 240 | 4 | 30 | 48 |
| Alaska |  |  |  |  | 1 | 1 |  |
| Hawaii |  |  | 11 |  |  |  |  |

[1] New York City only.

## Reported Cases of Selected Communicable Diseases: United States, Week Ended Dec. 30, 1950—Continued

[Numbers under diseases are International List numbers, 1948 revision

| Area | Rocky Mountain spotted fever (104) | Scarlet fever (050) | Smallpox (084) | Tularemia (059) | Typhoid and paratyphoid fever [1] (040, 041) | Whooping cough (056) | Rabies in animals |
|---|---|---|---|---|---|---|---|
| **United States** | 1 | 1,452 | | 19 | 29 | 1,387 | 98 |
| **New England** | | 171 | | | 2 | 258 | |
| Maine | | 16 | | | | 30 | |
| New Hampshire | | 7 | | | | | |
| Vermont | | 5 | | | | 116 | |
| Massachusetts | | 114 | | | 1 | 80 | |
| Rhode Island | | 5 | | | 1 | 6 | |
| Connecticut | | 24 | | | | 26 | |
| **Middle Atlantic** | | 204 | | 1 | 4 | 197 | 8 |
| New York | | [2] 123 | | 1 | 3 | 70 | 8 |
| New Jersey | | 17 | | | 1 | 78 | |
| Pennsylvania | | 64 | | | | 49 | |
| **East North Central** | | 497 | | 8 | 5 | 328 | 22 |
| Ohio | | 244 | | 1 | 3 | 92 | 7 |
| Indiana | | 30 | | 2 | 2 | 28 | 6 |
| Illinois | | 58 | | 5 | | 15 | 2 |
| Michigan | | 146 | | | | 110 | 7 |
| Wisconsin | | 19 | | | | 83 | |
| **West North Central** | | 71 | | 2 | 2 | 47 | 5 |
| Minnesota | | 14 | | | | 6 | |
| Iowa | | 5 | | | 1 | 3 | 5 |
| Missouri | | 12 | | 2 | 1 | 5 | |
| North Dakota | | 4 | | | | 3 | |
| South Dakota | | | | | | | |
| Nebraska | | 13 | | | | 1 | |
| Kansas | | 23 | | | | 29 | |
| **South Atlantic** | 1 | 118 | | 2 | 4 | 142 | 14 |
| Delaware | | 1 | | | | 6 | |
| Maryland | | 6 | | 1 | 1 | 12 | |
| District of Columbia | | 10 | | | 2 | 5 | |
| Virginia | | 37 | | | | 58 | 2 |
| West Virginia | | | | | | 17 | 1 |
| North Carolina | 1 | 46 | | 1 | | 21 | |
| South Carolina | | 4 | | | 1 | 10 | 8 |
| Georgia | | 10 | | | | 7 | 3 |
| Florida | | 4 | | | | 6 | |
| **East South Central** | | 100 | | 1 | 2 | 38 | 18 |
| Kentucky | | 26 | | | | 4 | 4 |
| Tennessee | | 60 | | 1 | 2 | 10 | 10 |
| Alabama | | 11 | | | | 19 | 3 |
| Mississippi | | 3 | | | | 5 | 1 |
| **West South Central** | | 74 | | 4 | 6 | 210 | 27 |
| Arkansas | | 3 | | 3 | 1 | 60 | 3 |
| Louisiana | | 3 | | | | 1 | |
| Oklahoma | | 16 | | | | 3 | 2 |
| Texas | | 52 | | 1 | 5 | 137 | 22 |
| **Mountain** | | 19 | | 1 | | 115 | |
| Montana | | 1 | | | | 23 | |
| Idaho | | 2 | | | | 3 | |
| Wyoming | | | | | | 7 | |
| Colorado | | 6 | | | | 10 | |
| New Mexico | | 5 | | | | 35 | |
| Arizona | | 5 | | | | 37 | |
| Utah | | | | 4 | | | |
| Nevada | | | | | | | |
| **Pacific** | | 198 | | | 4 | 52 | 4 |
| Washington | | 62 | | | | 14 | |
| Oregon | | 48 | | | | 7 | |
| California | | 88 | | | 4 | 31 | 4 |
| Alaska | | | | | | 2 | |
| Hawaii | | | | | | 8 | |

[1] Including cases reported as salmonellosis. [2] Including cases reported as streptococcal sore throat.

# FOREIGN REPORTS

## CANADA

*Reported Cases of Certain Diseases—Week Ended Dec. 9, 1950*

| Disease | New-foundland | Prince Edward Island | Nova Scotia | New Bruns-wick | Que-bec | On-tario | Mani-toba | Sas-katch-ewan | Al-berta | Brit-ish Co-lum-bia | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Brucellosis | | | | | | 1 | | | | | 1 |
| Chickenpox | 5 | | 56 | 1 | 174 | 528 | 51 | 177 | 147 | 117 | 1,286 |
| Diphtheria | | | 1 | | 2 | - | | | | 1 | 1 |
| Dysentery, bacillary | | | | | 7 | 8 | | | | | 15 |
| German measles | | | - | | 1 | 59 | - | 8 | 18 | 93 | 182 |
| Influenza | | | 14 | | | | 1 | | | 1 | 16 |
| Measles | 12 | | 15 | | 281 | 1,161 | 36 | 11 | 21 | 44 | 1,581 |
| Meningitis, meningococcal | | | | 1 | | 2 | 1 | | | 1 | 5 |
| Mumps | 10 | | 13 | | 125 | 353 | 22 | 144 | 229 | 153 | 1,049 |
| Poliomyelitis | | | | | | - | | 2 | 1 | | 3 |
| Scarlet fever | 1 | | | 2 | 70 | 57 | 8 | 20 | 70 | 43 | 271 |
| Tuberculosis (all forms) | 2 | | 10 | 11 | 71 | 23 | 53 | 11 | 1 | 51 | 219 |
| Typhoid and paratyphoid fever | | | - | | 5 | 1 | 1 | 6 | | | 13 |
| Venereal diseases | | | | | | | | | | | |
| Gonorrhea | 6 | | 5 | 3 | 87 | 53 | 20 | 20 | 39 | 57 | 209 |
| Syphilis | 6 | | 6 | 5 | 71 | 15 | 4 | 3 | 3 | 12 | 125 |
| Primary | | | 1 | | 1 | 5 | | 2 | - | | 12 |
| Secondary | | | 1 | 1 | 5 | 3 | - | | | | 10 |
| Other | 6 | | 1 | 1 | 62 | 10 | 4 | 1 | 3 | 12 | 106 |
| Whooping cough | 12 | | 14 | 11 | 32 | 108 | 36 | 1 | 2 | 36 | 252 |

## REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

The following reports include only items of unusual incidence or special interest and the occurrence of these diseases, except yellow fever, in localities which had not recently reported cases. All reports of yellow fever are published currently. A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

### Cholera

*India.* Cholera was reported for cities in India during the week ended December 16, 1950, as follows: Calcutta 18 cases, Madras 14, Negapatam 9, and Tuticorin 18. For the week ended December 23, 59 cases were reported in Calcutta.

*Pakistan.* Reported cases of cholera in East Bengal Province almost doubled from 335 for the week ended November 18, 1950, to 633 for the week ended November 25. For the week ended December 16, two cases were reported in Dacca.

### Plague

*India.* One imported fatal case of plague was reported in Allahabad for the week ended December 16, 1950. This is the first case since June 3, when one case was reported.

*Thailand.* During the week ended December 9, 1950, one case of plague was reported in Thailand, and one fatal case was reported for the week ended December 2.

### Smallpox

*Burma.* One case of smallpox was reported in Moulmein for the week ended December 23, 1950. For the week ended December 16, eight cases were reported.

*India.* For the week ended December 23, 1950, 324 and 16 cases were reported in Calcutta and Bombay, respectively. During the previous week 238 cases were reported in Calcutta and 17 in Bombay. Nagpur reported 56 cases for the week ended December 16 as compared with 177 for the previous week.

### Typhus Fever

*Iraq.* During the week ended December 23, 1950, two cases of typhus fever were reported in Baghdad.

*Turkey* The incidence of typhus fever was 11 cases for the week ended December 23, 1950, which is the same number reported for the previous week. Istanbul continued to report one case each week.

### Yellow Fever

*Colombia.* One fatal case of jungle yellow fever was reported in Landazuri on November 4, 1950, and in Cuesta Rica one fatal case was reported November 19. Both cases were in Santander Department. On November 30, one fatal case was reported in Chisu, Boyaca Department.

## CDC Laboratory Training Courses, 1951

The laboratory training courses given by the Communicable Disease Center of the Public Health Service have been scheduled for 1951.

Information and application forms should be requested from the Officer in Charge, Laboratory Training Services, Communicable Disease Center, Public Health Service, P. O. Box 185, Chamblee, Ga.

The schedule of the training courses in laboratory diagnosis follows:

Syphilis. Feb. 12–23; Mar. 12–23; Apr. 16–27; June 1–15; Sept. 10–21; and Oct. 22–Nov. 2.

Microbiology for public health nurses. Feb. 26–Mar. 2 and Aug. 27–31.

Bacterial diseases: general bacteriology, part 1. Feb. 26–Mar. 9 and Aug. 27–Sept. 7.

Parasitic diseases. Part 1. Intestinal parasites. Mar. 5–23 and Sept. 3–21.

Bacterial diseases: general bacteriology, part 2. Mar. 12–23 and Sept. 10–21.

Parasitic diseases. Part 2. Blood parasites. Mar. 26–Apr. 13 and Sept. 24–Oct. 12.

Enteric diseases. Part 1. Introductory enteric bacteriology. Mar. 26–30 and Sept. 24–28.

Enteric diseases. Part 2. Advanced enteric bacteriology. Apr. 2–13 and Oct. 1–12.

Mycotic diseases. Part 1. Cutaneous and subcutaneous fungi. Apr. 16–27 and Nov. 5–16.

Tuberculosis. Apr. 16–27; Apr. 30–May 11; Nov. 5–16; and Nov. 19–30.

Virus diseases. Apr. 16–May 11 and Sept. 3–28.

Mycotic diseases. Part 2. Systemic fungi. Apr. 30–May 11 and Nov. 19–30.

Venereal diseases (directors). May 7–11.

Mycotic diseases (directors). May 14–18 and Oct. 29–Nov. 2.

Tuberculosis (directors). May 14–18 and Oct. 29–Nov. 2.

*Treponema pallidum* immobilization (directors). May 14–18.

Rabies. May 14–18 and Oct. 1–5.

Clinical chemistry. Part 1. Introductory and general procedures May 14–18 and Oct. 29–Nov. 2.

Parasitic diseases (directors). May 21–25 and Oct. 22–26.

Bacterial diseases (directors). May 21–25 and Oct. 22–26.

Virus diseases (directors). May 21–25 and Oct. 8–12.

Clinical chemistry. Part 2. Quantitative analyses. May 21–June 1 and Nov. 5–16.

Preparation and standardization of serologic reagents used in the laboratory diagnosis of syphilis. Nov. 5–23.

The following courses will be given by special arrangement:

Laboratory diagnosis of malaria. 2 weeks.

Identification of medically important arthropods. 2 weeks.

Typing of *Corynebacterium diphtheriae*. 1 week.

Phage typing of *Salmonella typhosa*. 1 week.
Serologic diagnosis of rickettsial diseases. 1 week.
Virus isolation and identification techniques. 2 to 4 weeks
Laboratory diagnosis of influenza. 1 week.
Advanced quantitative analyses in clinical chemistry. 1 week.
Toxicology. 1 week.



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The printing of this publication has been approved by the Director of the Bureau of the Budget (August 10, 1949).

The PUBLIC HEALTH REPORTS, first published in 1878 under authority of an act of Congress of April 29 of that year, is issued weekly by the Public Health Service through the Division of Public Health Methods, pursuant to the following authority of law: United States Code, title 42, sections 241, 245, 247; title 44, section 220.

It contains (1) current information regarding the incidence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

The PUBLIC HEALTH REPORTS is published primarily for distribution, in accordance with the law, to health officers, members of boards or departments of health, and other persons directly or indirectly engaged in public health work. Articles of special interest are issued as reprints or as supplements, in which forms they are made available for more economical and general distribution.

Requests for and communications regarding the PUBLIC HEALTH REPORTS, reprints, or supplements should be addressed to the Surgeon General, Public Health Service, Washington 25, D. C. Subscribers should remit direct to the Superintendent of Documents, Washington 25, D. C.

Librarians and others should preserve their copies for binding, as the Public Health Service is unable to supply the general demand for bound copies. Indexes will be supplied upon request.

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# Public Health Reports

VOLUME 66 JANUARY 26, 1951 NUMBER 4

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FEDERAL SECURITY AGENCY

PUBLIC HEALTH SERVICE

the Borden-La Follette Act and administered by the Office of Vocational Rehabilitation, also part of the Federal Security Agency, represents another major health service.

Many of these programs differ in approach from the earlier public health services. In the past, concern for individual health, as related to public health programs, was expressed chiefly in terms of mass control measures, whereas now many of the publicly supported programs involve a large element of service to the individual. Added together, our current tax-supported programs provide essential diagnostic and treatment services for a significant proportion of our population, and include some individual services which are available to all citizens, regardless of their economic status. Tangible evidence of the magnitude of these programs is the fact that public agencies and institutions spend between 1 and 1.5 billion dollars annually on health services and medical care in the States and communities.[1]

If the people are to be adequately served and if tax funds are to be efficiently used, public agencies at every level must operate within the framework of a total program. They must see their particular function in the health field as a segment of the whole, recognizing their own strengths and limitations, and utilizing each other's services and competencies to the fullest advantage. Just as the needs of the individual cut across jurisdictional categories, so must the operations of the agencies that serve him.

Each new piece of health legislation has added to the urgency of our need to develop mechanisms for coordination and cooperation among public agencies involved in any aspect of health and medical services. Only through such coordination and cooperation can we utilize to the full existing resources, develop new resources, eliminate duplication of services, resolve inconsistencies and conflicts in policies. Public Law 734, which permits welfare agencies to take substantially more responsibility for the content of medical care programs for the indigent, makes the need for joint planning imperative.

What provisions can be made to assure that the care paid for by welfare agencies is of high quality? To what degree can the services these clients need be supplied by existing public programs? For the answer to such questions, welfare agencies are looking increasingly to their health agencies, and it is right that they should do so. In the last analysis, responsibility for public health is vested in the health department, and it should be expected to take the lead in building, so to speak, a master plan for the total health program of the State or community. No other public agency has the concentration of medical and health personnel who could qualify it for this task.

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[1] Census Bureau compilation of State expenditures for health (including Federal grants) and city expenditures (over 25,000 population) for 1948, and county expenditures for 1946 total 1.3 billion Public assistance medical care in 1948 is estimated at 125 million.

The desirability of centralizing responsibility for the general oversight of all health matters has long been recognized by authorities in both the health and welfare fields. The American Public Welfare Association, as far back as 1938, was specific in its recommendations, stating "it is essential that the administration of all preventive and curative services provided directly by tax funds, as well as the administration of all payments from tax funds to nongovernmental medical agencies and practitioners be closely related and functionally coordinated."[2] More recently, in fact, on January 7 of this year, the American Public Welfare Association presented a resolution on this subject which was adopted by the six national organizations who form the Inter-Association Committee on Health.[3] The resolution stated in part "any provision to finance medical care for assistance recipients should permit the administration of the medical aspects of such care by public health departments and . . . such arrangements should have the support of these six organizations." With this unanimity of agreement, there can be no doubt about the necessity of health departments playing a major role in the development of tax-supported programs in which medical judgment and supervision are involved.

The question, therefore, is not *should* the health agency take leadership in setting up plans for carrying out the medical care provisions of Public Law 734, but *how* should it do so. The specific arrangements will inevitably vary from State to State and from community to community. This is to be expected and is desirable, because people, States, communities, economies, and societies differ. However, from past experience in tax-supported health and medical care programs, we already have some fundamental principles which we know can be applied to advantage in any area, regardless of local variations.

We know, for example, that if a program is to operate democratically with the enlightened support of its citizens, it must take into consideration the needs and opinions of the persons who use its services as well as of those who provide the services. And we know that this can be done only with the aid of citizens' advisory committees which are truly representative of both the users and providers of service. It seems to me that provision for such State and local advisory committees should be written into State plans. I consider the advisory committee absolutely essential in assuring that the policies under which the program operates will be in line with public needs. At present, very few States and localities have such committees, and where they do exist their membership and function are limited. Committees of physicians to negotiate fee schedules are probably the

[2] Organization and Administration of Tax-Supported Medical Care. Committee on Medical Care of the American Public Welfare Association, December 1939.

[3] American Dental Association, American Hospital Association, American Medical Association, American Nurses Association, American Public Health Association, and American Public Welfare Association

most common. Committees dealing with such special technical or professional matters could more properly be established as special subcommittees to the general group which considers broad policies.

Corollary to the need for a citizens' advisory committee which will see the health program as a whole and make its recommendations accordingly, is the need for free channels of communication among the staffs of all governmental agencies that will be involved in carrying out such recommendations. An interdepartmental committee of State or local government officials helps meet this problem of communication. Such a committee would include representatives from all public agencies dealing with preventive or curative services in hospitals, clinics, and homes, or furnishing medical care to special groups such as children and the blind.

In the specific planning for implementing the medical care provisions of Public Law 734, some strengthening of relations between health and welfare agencies would seem to be indicated. The health officer might serve in an official advisory capacity to the welfare department. Or conversely, responsibility for administration of the medical care program might be delegated to the health department with the welfare department serving in an advisory capacity. This might be done locally, even where it is not feasible on a State-wide basis. Another possible method might be the assignment of health department personnel to the welfare department. If there is a medical staff in the welfare department, it should communicate with the health department. The medical officer, whether an employee of the health or welfare department, would have as his main responsibility the establishment of liaison between the two departments and the development of the closest possible working relationships between these two agencies and all other official, professional, and voluntary groups involved in the medical care program.

All of these organizational devices for obtaining cooperation among personnel and achieving coordination of services have been suggested by the American Public Welfare Association in the report which it submitted last fall to the Inter-Association Committee on Health.[4] And all of these devices have some measure of proved effectiveness in the operation of other health programs. The organizational devices used, however, are less important than the spirit and attitudes of those who use them. It is conceivable that an effective program might be developed without any formal provision for cooperation. If health and welfare staffs work closely and congenially together and consult spontaneously whenever they deal with interrelated problems, they will inevitably make plans together and define areas of responsibility for this program, just as they have for other programs in the

[4] Not published.

past. Ideally, of course, cooperative efforts should be carried on through both formal and informal channels.

Granting the necessity for cooperative endeavor, what are some of the immediate tasks to which it should be directed in order that Public Law 734 can mean improved health service for public assistance clients? Here again, no specific answers will hold valid in all areas. Alert health and welfare agencies will find their answers arising from their own local needs and situations. In fact, perhaps the greatest boon of the Social Security Amendments is that they will stimulate a fresh review of existing services. The health officer has information on all the public health and medical care programs supported by tax funds—not only those which are operated for the medically indigent, but also those which are available to all citizens, regardless of income. It is essential that the welfare agency know about and utilize these existing resources to the fullest extent and not duplicate them in setting up machinery for handling the medical care provision of Public Law 734. It is also important to eliminate conflicts and inconsistencies in existing programs. For example, in some areas, the health and welfare departments have different payment schedules for the same services, causing unnecessary confusion and difficulty in their relations with private physicians and other vendors of service. This is the time to set existing programs in order so that expanded services can be geared into them efficiently and economically.

During the course of program review and evaluation, the study of medical care programs in other jurisdictions may be helpful. The Bureau of Public Assistance, in 1946, conducted a comprehensive study in cooperation with 20 States. Special studies have also been made of the programs in the States of Washington and Maryland. In Maryland, the health department administers the present medical care program for the medically indigent. I would expect that, in States where such an arrangement exists or is initiated, funds for strengthening the program might be made available to the health department under the provisions of Public Law 734.

State and local enabling legislation will need review in order to determine whether the jurisdiction can receive the full benefit of the changes in the Federal law. Some States and local communities have restrictive provisions regarding type of service, eligibility of recipients, and responsibility for administration. Some States limit or even prohibit the transfer and administration of funds from one agency to another, even though the latter may be in a better position to give the service. Obviously, before any specific plans can be made, the legislation which would affect them needs to be examined.

Other issues that will need to be settled have already been outlined by the American Public Welfare Association. They include:

1. Definition of allowable medical expense items for which the State will accept financial responsibility.

2. Provisions governing patient's selection of physicians, dentists, and other vendors of health or medical services.

3. Fee schedules, hospital rates, contractual agreements, membership in prepayment plans, maximum limitations, and similar items governing payment. If a pooled fund is established, for example, how would it be set up and administered?

4. Method of authorizing service for purpose of reimbursement, reporting devices, and other necessary mechanics of administration.

5. Contractual arrangements with the public health departments, if the welfare agency wishes to undertake a cooperative administrative relationship with the health agency.

Each of these issues, and others, call for judgments and competencies which the health department can be expected to supply. Since all services covered by the State plan must be State-wide in scope, the State health officer's knowledge of the adequacy, or inadequacy, of local public health services throughout the State will be important. Health department data on incidence of illness and disability rates will also be of aid in estimating cost of services so that coverage, at the outset, can be geared to budget limitations and will not have to be curtailed later.

The health department should likewise be prepared to advise on safeguards to be thrown around provisions for prepayment plans. This is particularly important since many States will want to take advantage of the opportunity which Public Law 734 provides for participating in prepayment plans and since they have had little or no experience in using such plans.

Under Public Law 734, a State agency must be designated to be responsible for establishing and maintaining standards for public medical institutions and private institutions offering medical or domiciliary care to public assistance clients. It would seem logical that the hospital authority, which is usually the health department, should be the agency designated, since it already has responsibility for licensing hospitals and, in some instances, nursing homes. It would, however, be essential that the hospital authority consult with the welfare department in formulating policies for licensure. Although July 1, 1953, is the deadline date for the carrying out of this amendment, preliminary planning will need to be started almost immediately.

Both the health department and the vocational rehabilitation agency have a direct interest in the new category of clients covered by Public Law 734—the permanently and totally disabled. What machinery should be established for certification of eligibility? How shall medical need be determined? What rehabilitation services shall be

provided? Fortunately, health departments and vocational rehabilitation agencies have a fine record of cooperative relationships, at both State and local levels. Thus, many of the mechanisms for developing a coordinated program for clients in this category already exist.

With proper preparation and close cooperation among all concerned, I believe that the plans made for the administration of the Social Security Amendments can carry us forward to a higher standard of care for all medically indigent. For example, the investment which public agencies will now be making in direct payments for medical care for the aged places them in a strong position to change the present emphasis on palliative measures to one of real rehabilitation. The work which has been done by Dr. Murray Ferderber and his associates with patients in the Allegheny County, Pa., almshouse indicates what could be accomplished everywhere if real effort, ingenuity, and leadership were devoted to a program for restoring the aged and handicapped to a maximum degree of usefulness. Of 308 patients involved in Dr. Ferderber's intensive rehabilitation program, 80 percent recovered at least to the point of not being bedridden, and 28 percent were able to leave the institution.

Similarly, with the more liberal provisions for medical care for dependent children which Public Law 734 makes possible, standards could be established which would include preventive as well as curative services for children.

State health and welfare agencies are in a strategic position to play the major role in the progressive advancement of tax-supported health services. Their local counterparts, working with the same high degree of cooperation, might be even more influential if they were more adequately equipped and staffed. Unfortunately, many communities have not yet established full-time local health departments, and, consequently, cannot rely on a local health officer for leadership in the development of the health and medical care programs which are authorized under Public Law 734 and other recent health legislation. This makes the role of the State health department even more crucial, both in State-level planning and in stimulating the development of local health facilities. It will, therefore, be particularly important for State health officers to recognize their responsibilities in this field and to be prepared to give the State directors of welfare extensive cooperation and assistance.

We, in the Public Health Service, will do all within our power to assist the State health officers in fulfilling these responsibilities. Discussion of ways in which health departments can give leadership under Public Law 734 was, in fact, one of the major items on the agenda of the Surgeon General's Conference with the State and Territorial Health Officers held in October.

Here in Washington, the Commissioner of the Social Security


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Administration and the Surgeon General of the Public Health Service have had several discussions about ways in which the Public Health Service can be of assistance both in advising the Social Security Administration and in stimulating State health departments to assist State welfare departments. The Surgeon General has recently appointed a staff committee representing the various units of the Public Health Service which are concerned with medical care programs, and this committee is working on ways of developing closer relationships with all other Federal agencies involved in such programs. The information which they compile and the policies which they recommend, as well as the liaison they maintain with other agencies, should prove valuable in strengthening all medical programs, including those affected by Public Law 734.

Cooperative assistance to the Social Security Administration on specific problems relating to Public Law 734 will be provided by the Office of the Surgeon General and the Division of State Grants. Personnel in that Division have had a great deal of experience in working with States on health matters, and the full resources of that unit will be used in providing assistance on both policy and operational measures.

To further facilitate the free flow of information and service between health and welfare personnel of the Federal Security Agency, one of our Public Health Service officers, who is an expert on total and permanent disability, has been loaned to the Social Security Administration to work on that aspect of the legislation. Members of the Public Health Service staff, including the unit that deals with States, also serve, together with representatives of the Bureau of Public Assistance, Children's Bureau, and Office of Vocational Rehabilitation, on a committee of the Social Security Administration which has been established to work out common principles which can be applied to carrying out the Social Security Amendments.

Through the Division of State Grants, material and other aids will be continuously supplied to medical directors in the regional offices. I am confident that they will work in close harmony with the regional representatives of the Social Security Administration so that States which request consultation or other services will receive the benefit of their joint endeavors. It might be very helpful for these two regional representatives to visit States together to facilitate the development of cooperative plans between State health and welfare departments.

All of us, in the health and welfare fields alike, are venturing into new territory as we search for ways of promoting a high level of physical and mental health among the indigent. The medical care provisions of Public Law 734 represent one more step toward this ultimate goal. How to use these provisions most effectively in the

interests of our citizens is the problem we all share. Some of the answers may be expected to come from Washington; some from cities and counties; some from the States. Pooling all these experiences, the day may come when basic policies and principles evolve that will help each of us to carry on our part of the job more effectively, providing the medically indigent with a quality of care immeasureably higher than they have received.

We cannot predict when that goal will be reached, but we can say with certainty that none of us can reach it alone. It can be attained only through the full operation of the teamwork principle. Every illness has a social component; every social dislocation, a health component. The unity of health and welfare problems demands teamwork between us, professionally as well as administratively. It also demands that we bring the public onto our team by giving them a responsible share in planning and policy making.

Wherever teamwork has been used, the rewards have been great. Conflicts are resolved; creative energies released. Harmony and spontaneity result and these are the only bases on which real progress in social action can be secured.

# Medical Services and the Social Security Act Amendments of 1950

By Selma J. Mushkin*

The Social Security Act Amendments of 1950 pave the way for considerable extension and expansion of medical care for the needy.[1] These amendments—approved by the President August 28, 1950—in addition to extending the coverage and liberalizing the benefits of the Federal old-age and survivors insurance system, make three major changes in the public assistance programs which will have an impact on medical services for assistance recipients.[2]

1. Federal grants may now be made to States with approved plans for assistance to the permanently and totally disabled, thus setting up a new categorical public assistance program.
2. Federal grants are authorized for direct payments for medical services to persons or institutions furnishing medical or remedial care to the needy who are aged, blind, permanently and totally disabled, or dependent children.
3. Federal aid is made available to finance payments to the aged, blind, or permanently and totally disabled recipients of public assistance who are patients in public medical institutions, other than institutions for mental diseases and tuberculosis. Under the amended provisions, States which make payments (for old-age assistance, aid to the blind, or aid to the permanently and totally disabled) to persons in public and private institutions are required, by July 1, 1953, to set up an agency or agencies to establish and maintain standards for these institutions.

## Federal Grants for Aid to the Permanently and Totally Disabled

Extension of the Federal public assistance grant programs to the permanently and totally disabled grew out of Congressional discussion of Administration proposals to extend the social insurance system to cover disability insurance and to provide Federal aid for general assist-

*Health Economist, Division of Public Health Methods, Public Health Service.

[1] Public Law 734, 81st Congress, introduced as H. R. 6000.

[2] The Social Security Act Amendments of 1950 also extend the Federal public assistance provisions to Puerto Rico and the Virgin Islands for the first time. The formula for Federal participation in public aid payments for these jurisdictions is different from that for States and Territories; and a ceiling is set by statute on the aggregate Federal grants that can be made in any fiscal year. Moreover, for these jurisdictions, there is no Federal participation in payments to the relative living with dependent children receiving aid.

ance. The Commissioner for Social Security, in presenting the recommendation for Federal funds for general assistance before the Ways and Means Committee, stated: "A serious gap in the public assistance program results from the limitation of Federal participation to public assistance for needy aged and blind persons and dependent children only. States and localities have attempted, with varying degrees of success, to provide aid to needy persons who do not fall within these groups. Although some States with relatively large financial resources are able to finance adequate programs of general public assistance, many States and a great many localities have such meager funds for general public assistance that needy persons applying for aid can get only the barest necessities, and sometimes not even that much."(*1*)

The Ways and Means Committee of the House of Representatives rejected the proposed Federal aid for general public assistance and advocated instead Federal grants to the States for assistance to permanently and totally disabled individuals who are in need. This new program, the Committee indicated in its report to the House of Representatives, would parallel and supplement the recommended social insurance protection against permanent and total disability for earners in employments covered by the insurance system, just as old-age assistance parallels and supplements old-age and survivors insurance. The report pointed out that the disability assistance program, furthermore, would help in providing more adequate assistance to this group of needy persons than is afforded under the general assistance program in which the Federal Government does not participate (*2*).

The Finance Committee in its report to the Senate rejected both insurance and assistance for the permanently and totally disabled and asked for further study of the problem of the disabled worker. In conference between House and Senate, the House recommendation for a fourth category of assistance to the needy who are permanently and totally disabled was agreed to and the Senate omission of the permanent and total disability insurance provision was accepted.

The legislation as passed by the Congress and approved by the President provides Federal grants to States with approved plans for aid to needy permanently and totally disabled individuals aged 18 or over. To be approved, the State assistance plan for this category of aid, as for the other categories set up under the Social Security Act of 1935, must meet certain general statutory standards. For example, the plan must be State-wide in operation and must provide for State financial participation and for administration or supervision of administration by a single State agency. The State plan must also provide opportunity for a fair hearing for those denied assistance and must limit the use of information about individual recipients to purposes directly connected with the administration of public assistance. The

State also must make such reports as are required by the Social Security Administration. Additional State plan requirements, established by statute, include provision for excluding permanent and total disability assistance to those receiving old-age assistance, aid to the blind, or aid to dependent children. Plans may not be approved if they impose citizenship requirements which disqualify any citizen of the United States, or if they impose residence restrictions more stringent than those permitted in the Federal act. The maximum residence restriction for approvable plans for permanent and total disability assistance is the same as that for plans for aid to the needy aged and blind, namely, 5 years during the 9 years immediately preceding the application for aid and continuous residence in the State for 1 year immediately preceding the application.

The Federal share of the cost of State assistance programs for needy persons who are permanently and totally disabled is determined by the formula that governs Federal aid for old-age assistance and aid to the blind. As in these two programs, the maximum payment to an individual on which the Federal share of payments is computed is $50 a month. Federal participation in payments up to this maximum is determined on the basis of three-fourths of the first $20 of the average monthly payment per recipient plus one-half of the remainder. Expenditures for administration are matched on the basis of $1 of Federal to $1 of State and local funds Under the Social Security Act, the amount of the aggregate Federal grant to a State for assistance is determined by the amount spent by the State and its localities, within the maximum on individual payments. The Federal payment is thus an open-end grant with no set allotment to a State and with no ceiling on the aggregate amount payable to a State.

In July 1950, about 500,000 cases, representing about 1 million or so persons, received general public assistance under State and local programs, aggregating $22.7 million for the month. Initially, most individuals aided under the new permanent and total disability assistance program will probably be taken from the general assistance rolls and transferred to the new program. However, some additional persons not receiving general assistance will probably receive aid under the new Federal-State program, even in the initial phases.

The Social Security Act Amendments of 1950 authorize grants to States with approved plans beginning with the quarter starting October 1, 1950. Although in some States general assistance is now restricted to those who are unable to work, in many others the general assistance rolls include persons who are employable as well as those unable to work The new Federal legislation will require formulation of State plans and, in some States, new legislation. Among the

problems which will require solution are the definition of disability for assistance purposes and the formulation of appropriate administrative mechanisms for determination of this eligibility factor and for review of medical findings. The Social Security Act Amendments of 1950 exclude aid to any individual who is an inmate of a public institution, except that Federal participation is available to persons who are patients in a public medical institution. The amendments, however, exclude aid to individuals who are patients in an institution for tuberculosis or mental diseases or who have been diagnosed as having tuberculosis or a psychosis and are patients in a medical institution as a result. In the development of State plans, it will be necessary to establish definite and effective policies with respect to each of these exclusions and to solve borderline problems which arise in the administration of aid to the permanently and totally disabled.

Administration of the new assistance category affords a unique opportunity to obtain additional information on prevalence and types of disability among the needy and to effect a cooperative and closer working relationship among the agencies of government concerned with disability. A tentative reporting procedure has been developed by the Bureau of Public Assistance of the Social Security Administration which, in addition to providing the necessary records of cases for effective administration of the program, will establish a basis for obtaining knowledge of the causes, duration, and disabling effects of impairments leading to a finding of permanent and total disability. Information will be obtained on the cause of the impairment (whether an employment injury, a congenital defect, or other cause); on the mobility of the individual, the medical care he requires and has received, his family status and living arrangements, his previous employment history, and any vocational rehabilitation services received; and on other detailed information on factors that affect the extent of the problem of permanent and total disability and methods of meeting the needs of the individual.

Arrangements are also being worked out for the cooperation of the welfare departments of the States and the State vocational rehabilitation and health agencies in the administration of the program. The long-range costs and effectiveness of the disability assistance program can be favorably affected by increasing the employability and self-reliance of persons on the assistance rolls. Rehabilitation of recipients under the assistance program should therefore encompass not only services leading to active participation in the labor market but also measures to promote productive activity in the home and to increase the ability of a seriously handicapped person to help himself. The Bureau of Public Assistance and the Office of Vocational Rehabilitation are urging the closest possible working relations between the two administrative agencies in order to maximize the services to individuals

eligible under the programs. The Public Health Service and the Social Security Administration also have established cooperative working arrangements, and Dr. Carl Rice of the Public Health Service is assisting the Bureau of Public Assistance in developing guides and administrative arrangements for the new program.

## Federal Aid for Medical Care in Behalf of Assistance Recipients

Assistance under the Social Security Act of 1935 was defined as money payments to individuals—a definition considered essential to establish the concept of assistance as a basic right of the individual and to emphasize his right and responsibility to manage his own affairs in the community. In the administration of the Social Security Act, Federal financial participation was precluded for any individual payment if the State imposed any expressed or implied restrictions on the recipient's use of the money payment. Federal funds were available for medical care only to the extent that costs of medical-care items were included, with costs of other budgeted needs, in unrestricted money payments to individual recipients. This limitation seriously impaired the effectiveness of the assistance programs in dealing with the problem of medical care for the needy. The unpredictable individual impact of illness and its costs made it difficult for States to make an allowance for medical expenses in money payments. Moreover, Federal matching was denied on payments made directly to hospitals, physicians, or others who provided care or services to recipients of assistance. Nor were Federal funds available for expenditures incurred by the welfare agencies for direct payments on behalf of recipients under group health insurance arrangements.

For almost a decade the Social Security Administration had urged that the basic legislation be amended to permit Federal financial participation in direct payments to hospitals, physicians, and others who furnished medical services to assistance recipients. H. R. 2892, introduced in the 81st Congress by Representative Doughton at the request of the President provided, in effect, for a separate medical assistance program under which the Federal Government would participate in expenditures for medical services up to an average of $6 a month for assistance recipients aged 18 or over and $3 a month for assistance recipients under age 18 receiving money payments or medical assistance under State plans. In the substitute bill, H. R. 6000, reported by the Ways and Means Committee to the House of Representatives, Federal funds were authorized to aid in financing direct payments to medical practitioners and others supplying medical service, including direct payments toward prepayment

plans such as Blue Cross. A separate medical assistance program was not provided for in H. R. 6000; aid to the needy under the separate assistance programs was redefined to include payments on behalf of the assistance recipient for medical services. Furthermore, in contrast to the Administration's recommendations, the Ways and Means Committee proposed that direct payments to medical practitioners and other suppliers of medical services, when added to money payments to assistance recipients, should not exceed the maximum individual payments on which Federal aid is computed. The same medical care provision was accepted by the Senate Finance Committee and enacted by the Congress.

The Social Security Act Amendments of 1950 redefine assistance under each of the categorical programs to mean money payments to, or medical or remedial care on behalf of, assistance recipients. Beginning October 1, 1950, Federal aid became available for direct expenditures for medical care under approved State plans for assistance to the needy aged, blind, permanently and totally disabled, and dependent children. The costs of medical care may be included within the maximums on individual payments in which the Federal Government will participate. The agency may make money payments to assistance recipients, payments to vendors directly, or contributions to prepayment plans. Such prepayment arrangements may be effectuated by properly safeguarded trust funds within the welfare agencies, by contract arrangements with health departments or other public agencies, or by insurance with private prepayment organizations.

The Federal share of the medical care costs, within the maximum limitations on individual payments, under each public assistance program will be about half of the expenditures for medical care under the assistance programs in States with approved plans. Because of the specific Federal grant formulas in these programs, the exact proportion of expenditures financed from Federal funds, within the individual maximums, will differ from State to State, depending on the level of average payments under each of the Federal-State assistance programs. As indicated earlier, the Federal share of old-age assistance, aid to the blind, and aid to the permanently and totally disabled is three-fourths of the first $20 a month of average payments and one-half of the remainder within a maximum of $50 a month for any recipient. The Federal share of aid to dependent children is three-fourths of the first $12 of average monthly payments per person aided and one-half of the remainder within maximums of $27 a month for the first child and adult relative with whom the child lives and $18 a month for each additional child in the family. Thus, the Federal shares under old-age assistance, aid to the blind, and aid to the permanently and totally disabled are as follows:


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| Average monthly payment * | Federal funds: Amount per recipient | Federal funds: Percent of total |
|---|---|---|
| $20 | $15 00 | 75 |
| 25 | 17. 50 | 70 |
| 30 | 20 00 | 67 |
| 35 | 22 50 | 64 |
| 40 | 25 00 | 62 |
| 45 | 27. 50 | 61 |
| 50 | 30 00 | 60 |
| 60 | 30. 00 | 50 |
| 70 | 30. 00 | 43 |

*The average for Federal matching purposes includes all payments of $50 or less and, in case of larger payments, only the first $50.

For aid to dependent children, assuming a two-child family plus one adult, the Federal shares are:

| Average monthly payments to the family * | Federal funds: Amount | Federal funds: Percent of total |
|---|---|---|
| $25 | $18. 75 | 75 |
| 35 | 26. 25 | 75 |
| 45 | 31. 50 | 70 |
| 55 | 36. 50 | 66 |
| 75 | 45. 00 | 60 |
| 90 | 45. 00 | 50 |
| 110 | 45. 00 | 41 |

*The average for Federal matching purposes includes all payments within the maximums for families of specified size and, in case of larger payments, the amount of such maximums.

As indicated in table 1, all States except Mississippi paid an average of more than $20 a month for old-age assistance in July 1950, hence any additional expenditures for medical care for the existing case load will be matched on the basis of $1 of Federal funds for $1 of State and local funds within the maximum on individual payments. However, States will receive no additional Federal aid for additional assistance expenditures on behalf of individuals already receiving the maximum. The chart indicates the percentage distribution of public assistance payments in September 1949 in relation to Federal matching maximums.

The availability of Federal funds for financing direct payments to physicians, hospitals, prepayment agencies, and others furnishing medical services and protection to assistance recipients affords an opportunity to the States to establish or improve their medical care programs for the approximately 5 million persons receiving aid under the Federal-State assistance programs. Moreover, Federal aid places upon the States responsibility for assuring that increasingly there will be uniformity among communities in the health services included under State assistance plans.

Before enactment of the Social Security Act Amendments of 1950,

Table 1. *Average monthly public assistance payments to recipients, by State, July 1950* [1]

| State | Old-age assistance payments per recipient | Aid to dependent children payments per family | Aid to the blind payments per recipient |
|---|---|---|---|
| Total | [2] $13.55 | [2] $70.15 | [3] $15.80 |
| Alabama | 20.21 | 20.77 | 22.71 |
| Arizona | 48.61 | 75.38 | 60.95 |
| Arkansas | 25.96 | 41.99 | 30.82 |
| California | 70.69 | 109.39 | 82.02 |
| Colorado | 65.65 | 79.22 | 54.66 |
| Connecticut | 62.41 | 116.46 | 61.84 |
| Delaware | 28.71 | 71.91 | 44.12 |
| District of Columbia | 39.23 | 73.20 | 41.08 |
| Florida | 34.87 | 44.37 | 38.21 |
| Georgia | 23.47 | 46.71 | 27.94 |
| Idaho | 43.21 | 94.18 | 46.50 |
| Illinois | 42.35 | 91.35 | 45.81 |
| Indiana | 36.30 | 66.43 | 38.92 |
| Iowa | 49.55 | [4] 77.89 | [4] 57.28 |
| Kansas | 50.09 | 64.35 | 50.83 |
| Kentucky | 20.56 | 37.42 | 21.97 |
| Louisiana | 47.33 | 48.82 | 42.92 |
| Maine | 44.50 | 64.74 | 45.19 |
| Maryland | 37.24 | 77.54 | 40.72 |
| Massachusetts | 65.43 | 112.10 | 66.54 |
| Michigan | 46.97 | 88.14 | 51.03 |
| Minnesota | 49.69 | 91.83 | 56.54 |
| Mississippi | 19.32 | 27.12 | 26.42 |
| Missouri | 43.83 | 52.47 | [5] 40.00 |
| Montana | 53.21 | 78.57 | 57.40 |
| Nebraska | 44.00 | 82.40 | 58.78 |
| Nevada | 51.10 | (6) | (6) |
| New Hampshire | 44.32 | 89.89 | 48.53 |
| New Jersey | 49.07 | 92.18 | 54.09 |
| New Mexico | 32.54 | 48.98 | 32.12 |
| New York | 51.74 | 100.84 | 57.93 |
| North Carolina | 22.20 | 43.51 | 34.03 |
| North Dakota | 48.70 | 99.04 | 47.52 |
| Ohio | 45.86 | [7] 61.39 | 45.12 |
| Oklahoma | 45.37 | 45.33 | 46.96 |
| Oregon | 53.61 | 104.12 | 62.53 |
| Pennsylvania | 37.54 | 84.39 | [8] 39.89 |
| Rhode Island | 46.06 | 87.47 | 53.48 |
| South Carolina | 20.70 | 26.79 | 25.15 |
| South Dakota | 39.26 | 63.54 | 35.42 |
| Tennessee | 31.19 | 48.43 | 38.16 |
| Texas | 33.63 | 42.85 | 38.01 |
| Utah | 44.86 | 84.76 | 49.22 |
| Vermont | 35.61 | 54.51 | 38.77 |
| Virginia | 21.58 | 46.78 | 29.46 |
| Washington | 65.25 | 95.49 | 77.58 |
| West Virginia | 27.20 | 55.51 | 31.00 |
| Wisconsin | 43.26 | 96.36 | 46.69 |
| Wyoming | 55.35 | 97.73 | 53.80 |

[1] For definition of terms see Social Security Bulletin, January 1948, pp. 24-26. All data subject to revision.

[2] Includes Alaska and Hawaii, which are not shown in table.

[3] Includes Hawaii, which is not shown in table; Alaska does not administer aid to the blind.

[4] Excludes cost of medical care, for which payments are made to recipients quarterly.

[5] Represents statutory monthly pension of $40 per recipient. Program administered without Federal participation.

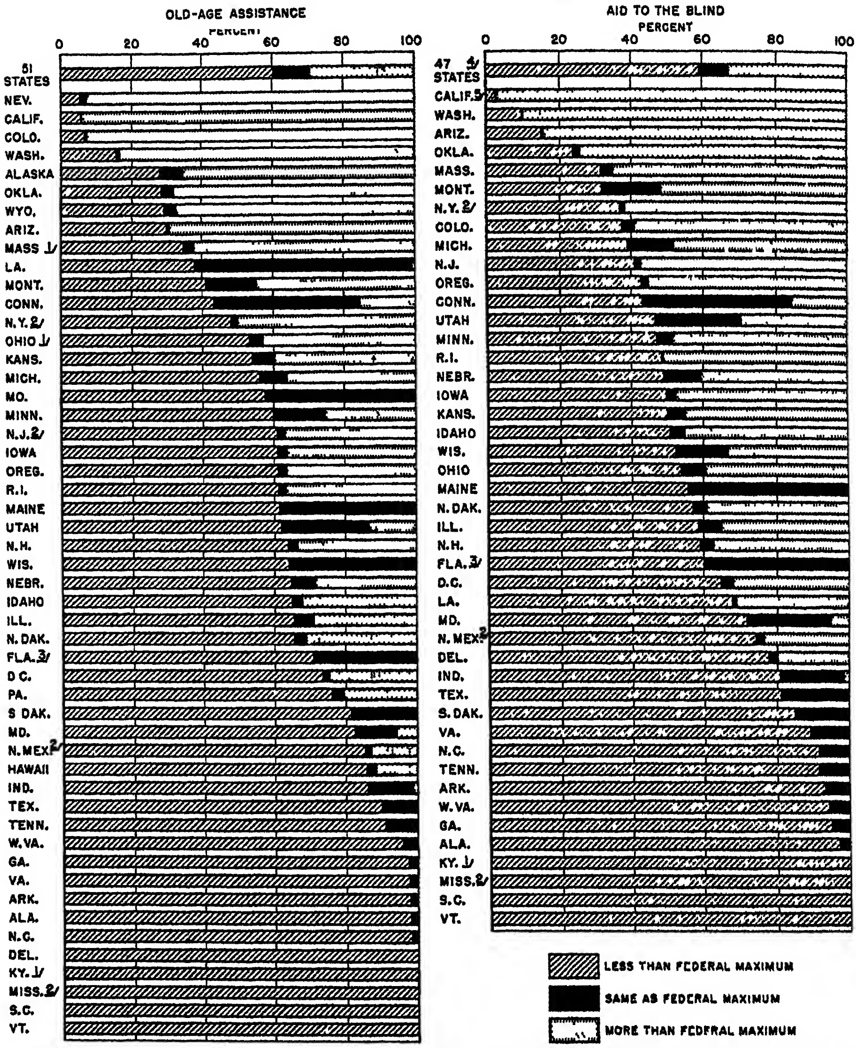
[6] Average payment not calculated on base of less than 50 cases.

[7] In addition to these payments from aid to dependent children funds, if supplemental payments from general assistance funds were included, the average payment would be $71.85.

[8] Program administered without Federal participation.

SOURCE: Bureau of Public Assistance, Social Security Administration.

... IN RELATION TO FEDERAL MATCHING ... WITH APPROVED PLANS, BY PROGRAM, SEPTEMBER 1949




[1] Data for December 1948.
[2] Data for August 1949.
[3] Data for October 1949.
[4] Total includes Wyoming and Hawaii with less than 100 recipients each.
[5] Excludes aid to the partially self-supporting blind.

many States met, from State and local assistance funds, the cost of medical care for public assistance recipients by payments directly to physicians, hospitals, or other individuals or institutions. In some of these States, medical costs for recipients of the special types of assistance under Federal-State programs were met from general assistance funds. In still others, State funds for the special programs were used. In Pennsylvania and West Virginia, all payments for medical services given to assistance recipients have been made directly to vendors. In a number of other States, vendor payments have been

made only for hospital expenses and other large bills. In a few States prepayment arrangements have been worked out for medical services to assistance recipients. In the State of Washington, physicians' services are provided through payment of $2.50 a month to the county medical service bureau for each person receiving assistance. In Kansas, in 1948, 27 of the 105 counties operated under medical insurance plans.

Great diversity has characterized the medical care plans for assistance recipients. The plans have run the entire gamut from the provision of comprehensive medical services available on a State-wide basis to separate local plans limited to physicians' services and drugs. A Bureau of Public Assistance study of welfare agency medical care plans in 42 States documents the wide variation in administrative practices and in financing.[3] Of the 42 States studied, only 8 had positions for a full-time medical director at the time of the survey (1946). Of these positions, two were vacant. Only 15 of the 42 States had general or technical advisory committees, and a number of these committees had not met within the preceding year. The memberships of the advisory committees that have been set up have usually been restricted and their functions limited to one phase of the program such as establishment of a fee schedule for physicians. Generally, in the States which make payments to physicians for services to assistance recipients, the recipient has free choice of practitioner. In others, city or county physicians are employed. Some States have standards of qualification for practitioners participating in the program, restricting those participating to physicians licensed to practice medicine and surgery. Diversity is found among the States, and often within States, in fees paid for medical services and in the basis for determining fees. Generally, fees paid are below the level prevailing in the community.

A recent study made in the Bureau of Public Assistance indicated that in the calendar year 1949 a total of about $125 million was spent by welfare agencies for medical care of the needy (*3*). Of this total, almost $85 million was spent for direct payments to physicians, hospitals, and others supplying services to assistance recipients toward which no Federal funds could be obtained. Although interstate comparisons are invalidated by differences in budgetary practices of the States, and differences in the degree to which cash and direct vendor payments are made, table 2 is of interest in illustrating the effect of medical care expenditures on the aggregate assistance payment per recipient. In four of the seven States,[4] spending an average of more than $4 per case for medical care on behalf of old-age assistance recipients, the total payment per recipient for cash assistance

[3] Unpublished data, Bureau of Public Assistance.

[4] Connecticut, Minnesota, Nebraska, New Hampshire, New York, Washington, and Wisconsin

Table 2. *Special types of public assistance: Average monthly payments to recipients and monthly payments to vendors for medical services, by program 23 States, 1949* [1]

| State | Old-age assistance: Total amount | Old-age assistance: Money payments to recipients | Old-age assistance: Payments to vendors for medical services: Average per recipient | Old-age assistance: Payments to vendors for medical services: As percent of money payments | Aid to dependent children: Total amount | Aid to dependent children: Money payments to recipients | Aid to dependent children: Payments to vendors for medical services: Average per family | Aid to dependent children: Payments to vendors for medical services: As percent of money payments | Aid to the blind: Total amount | Aid to the blind: Money payments to recipients | Aid to the blind: Payments to vendors for medical services: Average per recipient | Aid to the blind: Payments to vendors for medical services: As percent of money payments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Connecticut | $59.74 | $55.49 | $4.25 | 7.7 | $106.98 | $103.19 | $3.79 | 3.7 | $52.42 | $50.71 | $1.71 | 3.[illegible] |
| Delaware | | | | | 72.99 | 72.42 | .57 | .8 | | | | |
| Illinois | 47.27 | 43.76 | 3.51 | 8.0 | 100.22 | 98.62 | 1.60 | 1.6 | 48.51 | 45.86 | 2.65 | 5.[illegible] |
| Indiana | 39.04 | 35.13 | 3.91 | 11.1 | 60.68 | 58.15 | 2.53 | 4.4 | 40.95 | 37.35 | 3.60 | 9.[illegible] |
| Kansas | 49.52 | 47.40 | 2.12 | 4.5 | 88.09 | 83.14 | 4.95 | 6.0 | 52.20 | 49.52 | 2.68 | 5.[illegible] |
| Massachusetts | 62.14 | 61.47 | .67 | 1.1 | 114.70 | 113.35 | 1.35 | 1.2 | | | | |
| Minnesota | 48.48 | 44.07 | 4.41 | 9.2 | | | | | | | | |
| Missouri | 42.66 | 42.64 | .02 | (2) | 53.54 | 53.47 | .07 | .1 | | | | |
| Nebraska | [3] 46.89 | 42.41 | [3] 4.48 | 10.6 | [3] 84.62 | 84.48 | [3] .14 | .2 | [3] 51.30 | 51.07 | [3] .23 | .[illegible] |
| New Hampshire | 48.01 | 43.31 | 4.70 | 10.9 | 96.38 | 87.34 | 9.04 | 10.4 | 50.65 | 46.29 | 4.36 | 9.4 |
| New Jersey | 47.60 | 47.55 | .05 | .1 | 86.99 | 84.11 | 2.88 | 3.4 | 52.18 | 52.16 | .02 | (2) |
| New Mexico | [3] 35.44 | 35.03 | [3] .41 | 1.2 | [3] 53.23 | 52.41 | [3] .82 | 1.6 | [3] 37.72 | 37.25 | [3] .47 | 1.3 |
| New York | 58.08 | 53.42 | 4.66 | 8.7 | 113.54 | 108.63 | 4.91 | 4.5 | 64.08 | 59.94 | 4.14 | 6.9 |
| North Dakota | 47.95 | 46.49 | 1.46 | 3.1 | 99.14 | 98.68 | .46 | .5 | 47.43 | 47.18 | .25 | .5 |
| Ohio | 47.64 | 46.72 | .92 | 2.0 | | | | | | | | |
| Oregon | 51.76 | 49.53 | 2.23 | 4.5 | 104.81 | 101.93 | 2.88 | 2.8 | 58.33 | 56.13 | 2.20 | 3.9 |
| Pennsylvania | 41.58 | 40.00 | 1.58 | 4.0 | 94.44 | 91.81 | 2.63 | 2.9 | 40.85 | 39.92 | .93 | 2.3 |
| Rhode Island | 46.03 | 44.94 | 1.09 | 2.4 | 87.64 | 85.51 | 2.13 | 2.5 | 51.50 | 50.90 | .60 | 1.2 |
| South Dakota | [3] 40.07 | 38.09 | [3] 1.98 | 5.2 | [3] 61.09 | 59.75 | [3] 1.34 | 2.2 | [3] 35.74 | 35.01 | [3] .73 | 2.1 |
| Virginia | 20.34 | 20.30 | .04 | .2 | 44.37 | 44.25 | .12 | .3 | 27.80 | 27.76 | .04 | .1 |
| Washington | [3] 74.17 | 66.84 | [3] 7.33 | 11.0 | [3] 150.28 | 135.58 | [3] 14.70 | 10.8 | [3] 85.44 | 78.04 | [3] 7.40 | 9.5 |
| West Virginia | 25.33 | 24.21 | 1.12 | 4.6 | 49.92 | 48.39 | 1.53 | 3.2 | 28.89 | 27.81 | 1.08 | 3.9 |
| Wisconsin | 46.14 | 41.76 | 4.38 | 10.5 | 103.53 | 96.15 | 7.38 | 7.7 | 49.05 | 45.34 | 3.71 | 8.2 |

[1] Data not available for all programs for each of the 23 States.
[2] Less than 0.05 percent.
[3] Some expenditures from general assistance or other funds, not allocated by program, may be chargeable to these cases; amounts probably small except in Washington.

SOURCE: White, Ruth: Vendor payments for medical assistance. Social Security Bulletin 13: 4, June 1950.

Table 3. *Vendor payments for medical services, by type of case receiving services, 37 States, 1949*

| State | Total vendor payments | Payments on behalf of recipients of | | | | | | All other payments [3] |
|---|---|---|---|---|---|---|---|---|
| | | Old-age assistance [1] | Aid to dependent children [1] | Aid to the blind [1] | General assistance and medical care only [2] | | | |
| | | | | | Total [1] | General assistance | Medical care only | |
| Total, 37 States | $80,771,571 | $35,441,012 | $10,170,011 | $841,823 | $16,278,622 | ----- | ----- | $18,040,103 |
| Alabama | 10,262 | 4,388 | 2,013 | 147 | ----- | ----- | ----- | 3,714 |
| Arkansas | 198,305 | ----- | ----- | ----- | ----- | ----- | ----- | 198,305 |
| Colorado | 1,125,524 | 214,128 | 103,768 | 1,420 | ----- | ----- | ----- | 806,208 |
| Connecticut | 2,409,422 | 874,385 | 162,980 | 3,831 | [4] 1,368,226 | ----- | ----- | ----- |
| Delaware | 3,574 | ----- | 3,574 | ----- | ----- | ----- | ----- | ----- |
| Hawaii | 513,987 | ----- | ----- | ----- | ----- | ----- | ----- | 513,987 |
| Illinois | 9,680,015 | 5,346,727 | 478,710 | 144,428 | 3,710,150 | ----- | ----- | ----- |
| Indiana | 4,305,508 | 2,351,914 | 286,314 | 79,802 | 1,587,478 | ----- | ----- | ----- |
| Iowa | 1,424,998 | ----- | 107,996 | 26,763 | [5] 498,467 | ----- | ----- | 791,772 |
| Kansas | 2,139,685 | 950,382 | 307,815 | 24,780 | 839,660 | ----- | ----- | 17,048 |
| Louisiana [6] | 11,688 | 59 | 6,580 | 522 | 4,527 | $4,389 | $138 | ----- |
| Maine | 939,174 | ----- | ----- | ----- | ----- | ----- | ----- | 939,174 |
| Massachusetts | 2,563,935 | 760,305 | 190,122 | ----- | 1,613,508 | 1,613,508 | ----- | ----- |
| Michigan | 5,285,248 | ----- | ----- | ----- | ----- | ----- | ----- | 5,285,248 |
| Minnesota | 4,518,261 | 2,919,451 | ----- | ----- | ----- | ----- | ----- | 1,598,810 |
| Missouri | 81,792 | 30,430 | 18,754 | ----- | 32,608 | 12,997 | 19,611 | ----- |
| Montana | 1,103,728 | 396,710 | 44,214 | 13,266 | 187,513 | 44,820 | 142,693 | 462,025 |
| Nebraska | 1,451,118 | 1,279,204 | 5,505 | 1,587 | ----- | ----- | ----- | 164,822 |
| Nevada | 587,109 | ----- | ----- | ----- | ----- | ----- | ----- | 587,109 |
| New Hampshire | 572,596 | 401,758 | 154,338 | 16,500 | ----- | ----- | ----- | ----- |
| New Jersey | 1,169,495 | 15,155 | 176,406 | 126 | 135,696 | 135,696 | ----- | 842,112 |
| New Mexico | 199,870 | 46,320 | 45,643 | 2,526 | 73,096 | 44,056 | 29,040 | 29,255 |
| New York | 9,847,961 | 6,533,042 | 3,126,979 | 187,940 | (7) | ----- | ----- | ----- |
| North Carolina | 1,025,173 | ----- | ----- | ----- | ----- | ----- | ----- | 1,025,173 |
| North Dakota | 374,847 | 154,054 | 9,420 | 355 | 211,018 | ----- | ----- | ----- |
| Ohio | 6,126,520 | 1,337,690 | 287,465 | 16,507 | ----- | ----- | ----- | 4,434,858 |
| Oregon | 1,495,050 | 615,325 | 110,564 | 10,204 | 758,957 | ----- | ----- | ----- |
| Pennsylvania | 4,505,000 | 1,632,000 | 1,509,000 | 171,000 | 1,143,000 | 1,143,000 | ----- | ----- |
| Rhode Island | 455,516 | 127,757 | 84,357 | 1,126 | 242,276 | 234,297 | 7,979 | ----- |
| South Carolina | 63,548 | ----- | ----- | ----- | ----- | ----- | ----- | 63,548 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| South Dakota | 542,951 | 284,296 | 32,307 | 1,830 | 198,774 | | | 25,744 |
| Utah | 556 | 106 | 200 | | 250 | 250 | | |
| Virginia | 49,168 | 9,234 | 9,353 | 635 | 29,946 | 5,118 | 24,828 | |
| Washington [8] | 10,727,517 | 6,060,986 | 1,913,871 | 64,363 | 2,688,297 | | | |
| West Virginia | 760,363 | 320,977 | 243,319 | 11,824 | 184,243 | 70,898 | 113,345 | |
| Wisconsin | 4,171,510 | 2,608,550 | 732,604 | 59,424 | 770,932 | | | |
| Wyoming | 330,597 | 65,679 | 12,840 | 917 | | | | 251,161 |

[1] Data incomplete for some States; amounts not distributed by type of case included in "all other payments."

[2] For some States, expenditures for cases receiving general assistance and those receiving medical care only not reported separately.

[3] In most States includes payments, not distributed by type of case, made on behalf of recipients of the special types of public assistance, general assistance, and medical care only, usually from general assistance funds: no expenditures made from these funds for old-age assistance cases in Ohio, or for old-age assistance and aid to dependent children cases in New Jersey. In Minnesota expenditures from these funds for old-age assistance cases were probably very small.

[4] Includes costs of burials.

[5] A small amount of these expenditures chargeable to the special types of public assistance.

[6] For 6-month period, July–December 1949.

[7] Expenditures for medical services ($1,991,436) include both money payments to recipients and payments to vendors; data on distribution by method of payment not available.

[8] For January–June, excludes cost of operation of county medical institutions; part of this cost—possibly $1 million—was chargeable to recipients of assistance, including cases receiving medical care only.

SOURCE: White, Ruth: Vendor payments for medical assistance. Social Security Bulletin 13: 7, June 1950.

authorities in both the health and welfare fields. By incorporation of health services available exclusively to the needy in State assistance plans, by formal budgetary arrangements through welfare departments, as well as by compliance with other State assistance plan requirements of the Social Security Act Amendments of 1950, Federal aid may be obtained to help States expand medical services to the needy. Professional groups representing physicians, dentists, nurses, hospitals, public health workers, and social workers have urged administration of the medical care aspects of such programs by the health departments, through interagency contracts.

## Federal Aid for Assistance Recipients in Public Medical Institutions

Closely related to the problem of medical care for assistance recipients is that of institutional care for these groups. To prevent the continuance of poorhouses and perhaps even multiplication of these institutions with Federal financial support, the Social Security Act of 1935 prohibited Federal participation in payments to persons in public institutions, except to persons receiving medical care for a temporary period in public institutions. The Federal Government could participate in payments to the needy aged and needy blind requiring long-term medical care only if they resided in private institutions. It soon became apparent that modification was needed in the basic legislation. Jane Hoey, Director of the Bureau of Public Assistance, in testifying before the Ways and Means Committee of the House of Representatives on the Social Security Act Amendments, stated: "Many of the aged and blind recipients need long-time care in medical institutions. Private medical facilities cannot begin to care for all the people needing this type of care. The provision in the act barring the use of Federal funds for persons living in public institutions was intended to wipe out indiscriminate care in the old-time almshouse. Its effect has been to foster the development of commercial nursing and convalescent homes. Often these homes, which are operated for profit, are unlicensed and unsupervised and give very inferior care" (*6*).

The Social Security Act Amendments of 1950 make available Federal aid to finance payments to the aged, blind, and permanently and totally disabled recipients of assistance who are patients in public medical institutions, other than institutions for tuberculosis and mental diseases. Effective July 1, 1952, Federal financial participation is prohibited in payments to individuals in private institutions for tuberculosis and mental diseases and to an individual who has been diagnosed as having tuberculosis or a psychosis and who is a patient in a medical institution as a result thereof.

Under the amended provisions, existing public medical facilities can admit recipients of public assistance in need of long-term care without having the entire financial burden rest on the local community. Moreover, as indicated by the Finance Committee (*7*) in reporting the bill to the Senate: "If State-Federal old-age assistance is payable as would be provided by the bill to needy aged and to needy blind persons residing in public medical institutions, it is probable that many communities would develop additional facilities for chronically ill persons and thereby assist in meeting the increasing need for such facilities." Federal aid to mental and tuberculous patients in public medical institutions was excluded because of the nature of the illness, the large additional costs involved, and the prevalence of State hospital facilities for these patients.

As a necessary adjunct to the authorization for Federal participation in assistance to patients in public medical institutions, other than institutions for tuberculosis or mental diseases, the amendments require that an appropriate State authority (or authorities) be responsible for licensing and inspecting institutions to assure that their operation is in accord with standards established by the State. The Social Security Act Amendments of 1950 provide that, effective July 1, 1953, if a State plan for old-age assistance, aid to the blind, and aid to the permanently and totally disabled includes payments to individuals in private or public institutions, the plan must provide for the establishment or designation of a State authority or authorities which shall be responsible for establishing and maintaining standards for such institutions. As indicated in the report (*8*) of the Ways and Means Committee: "Persons who live in institutions, including nursing and convalescent homes, should be assured a reasonable standard of care and be protected against fire hazards, unsanitary conditions, and overcrowding."

A fairly good foundation already exists for the administration of this provision. A majority of the States have established comprehensive standards for licensure of hospitals and other institutions providing hospital and related care. All the States have established standards of hospital maintenance and operation for hospitals receiving Federal aid under the Hospital Survey and Construction Act; typically the licensing agency is the State health department. The need for interagency working arrangements has been indicated elsewhere in this issue. It is patently desirable to have a single standard-setting authority for medical institutions within each State and to utilize existing experience and machinery.

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(2) U. S. Congress. House. Committee on Ways and Means: Social Security Act Amendments of 1949. Report No. 1300 (81st Cong., 1st Sess.). Washington, D. C., U. S. Government Printing Office, August 22, 1949, p. 53.
(3) White, Ruth: Vendor payments for medical assistance. Soc. Sec. Bull. 13: 3–7, 10, 28, June 1950.
(4) Expenditures for civilian social security and related public programs. Soc. Sec. Bull. 13: 15–17, July 1950.
(5) Terris, Milton and Kramer, Nathan A.: Medical care activities of full-time health departments. Am. J. Pub. Health 39: 1129–1135 (1949).
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(7) U. S. Congress. Senate. Committee on Finance: Social Security Act Amendments of 1950. Report No. 1669 (81st Cong., 2d Sess.). Washington, D. C., Government Printing Office, 1950, p. 58.
(8) U. S. Congress. House. Committee on Ways and Means: Hearings on H. R. 2892 (81st Cong., 1st Sess.). Part 1. Public assistance and public welfare. Washington, D. C., U. S. Government Printing Office, 1949, p. 43.

## Civil Defense Health Service Planning

The full facilities of the Public Health Service are available to the States in the development of medical civil defense plans, Surgeon General Leonard A. Scheele told health directors of the States and Territories in a letter of January 4, 1951.

Referring to the recently issued manual, Health Services and Special Weapons Defense, Dr. Scheele pointed out that "the Federal Civil Defense Administration has recognized the important part the State health officers can play in civil defense." He reminded the State health officers that the Federal Civil Defense Administration has asked that the regional offices of the Federal Security Agency and the Public Health Service regional medical directors provide assistance to the States in formulating, revising, and maintaining civil defense health service plans.

"I want to assure you on my own behalf and that of the Public Health Service as a whole," the Surgeon General wrote, "that we regard this assignment as a serious challenge . . . I am asking our regional medical officers to offer their assistance to you in developing such medical and health civil defense plans as are required in your State. I want also to assure you that the facilities of our staff in Washington are available to you to the limit of our capacities."

Dr. Scheele emphasized that "our thinking and planning these days must go well beyond the usual components of peacetime programs. In addition to protection of water and food supplies, sanitation, and industrial health services, we must think, as well, in terms of mass casualty services and of defense against biological, radiological, and chemical warfare. We must think in terms of potential disasters far beyond our national experience. Our planning must, therefore, match in imagination and scope the greatest potential damage which could be inflicted on us by a determined enemy."

# Incidence of Disease

*No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring*

## UNITED STATES

### Reports From States for Week Ended January 6, 1951

*Measles.* For the current week 5,364 new cases of measles were reported as compared with 4,101 for the previous week. The 5-year (1946–50) median for the first week is 3,044.

*Other diseases.* There was an increase in the number of cases of whooping cough for the current week, 1,573, as compared with 1,387 for the previous week. Meningococcal meningitis increased from 78 for the week ended December 30 to 96 for the current week. Poliomyelitis cases decreased in number, 136 being reported for the week ended January 6. The total number of influenza cases reported was 1,849 for the current week.

### Reports of Epidemics

*Gastroenteritis.* In separate reports, Dr. R. M. Albrecht, New York State Department of Health, and Dr. J. C. Hart, Connecticut

*Comparative Data for Cases of Specified Reportable Diseases: United States*

[Numbers after diseases are International List numbers, 1948 revision]

| Disease | Total For Week Ended— | | 5-year median 1946–50 | Seasonal low week | Cumulative Total Since Seasonal Low Week | | 5-year median 1945–46 through 1949–50 |
|---|---|---|---|---|---|---|---|
| | Jan. 6, 1951 | Jan. 7, 1950 | | | 1950–51 | 1949–50 | |
| Anthrax (002) | 1 | ------- | (1) | (1) | (1) | (1) | (1) |
| Diphtheria (055) | 121 | 166 | 258 | 27th | 3,028 | 4,437 | 6,616 |
| Encephalitis, acute infectious (082) | 7 | 13 | 6 | (1) | (1) | (1) | (1) |
| Influenza (480–483) | 1,849 | 4,077 | 4,136 | 30th | 40,256 | 34,607 | 40,406 |
| Measles (085) | 5,364 | 3,044 | 3,044 | 35th | 34,053 | 22,174 | 28,893 |
| Meningitis, meningococcal (057.0) | 96 | 73 | 83 | 37th | 1,057 | 986 | 986 |
| Pneumonia (490–493) | 1,675 | 2,210 | ------- | (1) | (1) | (1) | (1) |
| Poliomyelitis, acute (080) | 136 | 124 | 79 | 11th | [2] 32,356 | 41,576 | 24,876 |
| Rocky Mountain spotted fever (104) | ------- | 1 | 1 | (1) | (1) | (1) | (1) |
| Scarlet fever (050) | [3] 1,455 | 1,232 | 2,007 | 32d | [4] 17,146 | 17,671 | 24,551 |
| Smallpox (084) | 1 | 1 | 3 | 35th | 9 | 8 | 25 |
| Tularemia (059) | 10 | 24 | 37 | (1) | (1) | (1) | (1) |
| Typhoid and paratyphoid fever (040, 041) [5] | 28 | 26 | 38 | 11th | 2,943 | 3,399 | 3,454 |
| Whooping cough (056) | 1,573 | 1,660 | 1,660 | 39th | 23,175 | 23,196 | 26,083 |

[1] Not computed. [2] Addition: Maryland, delayed report, 7 cases. [3] Including cases reported as streptococcal sore throat. [4] Addition: Utah, week ended December 30, 37 cases. [5] Including cases reported as salmonellosis.

State Department of Health, reported the occurrence of gastroenteritis in several groups of individuals following the ingestion of headcheese purchased from a single establishment in East Port Chester, Conn. This headcheese had been supplied by a meat market located in Brooklyn, N. Y.

On December 20, 1950, six cases occurred in Port Chester and Harrison, Westchester County, N. Y.: three women from Port Chester who lunched together that day, another woman in Port Chester, and an adult couple in Harrison. Eighteen individuals, residents of Greenwich, Conn., were affected following a party. The incubation period varied between 3 and 6 hours.

Samples of the headcheese were cultured at the Greenwich City Public Health Laboratory which revealed a profuse growth of staphylococci and *B. coli*. An employee of the establishment from which the headcheese was purchased is reported to have had diarrhea 2 to 3 days before the onset of the outbreak. The investigation is being continued to determine more accurately the source of infection.

Dr. A. L. Gray, Mississippi State Board of Health, has reported an outbreak of "food poisoning" on December 16, 1950, at a dinner party given by an industrial firm in a hotel in Jackson, Miss. Of the 150 people attending the dinner, 44 were affected with sudden onset of severe cramping, diarrhea, vomiting, muscle pains, and prostration. The incubation period ranged from 1 to 14 hours with a median of 7½ hours. It was impossible to determine the exact cause or source of the outbreak. No food was available for bacteriological examination. Sanitation of the premises and handling of food were excellent. Hotel employees who ate food remaining from the dinner were not ill.

## Laboratory Supplement

Laboratory confirmation has been received of a case of psittacosis in Chicago. The person affected was a woman who worked in a pet shop, where there were several sick parrots, prior to the onset of her illness on November 22, 1950. A complement fixation test on the patient's blood was negative in the acute stage of the disease and positive (1-32) on December 22. These tests were confirmed by the Illinois State Health Department Laboratory.

## Reported Cases of Selected Communicable Diseases: United States, Week Ended Jan. 6, 1951

[Numbers under diseases are International List numbers, 1948 revision]

| Area | Diphtheria (055) | Encephalitis, infectious (082) | Influenza (480–483) | Measles (085) | Meningitis, meningococcal (057.0) | Pneumonia (490–493) | Poliomyelitis (080) |
|---|---|---|---|---|---|---|---|
| **United States** | 121 | 7 | 1,849 | 5,364 | 96 | 1,675 | 136 |
| **New England** | 4 | | 2 | 211 | 3 | 64 | 4 |
| Maine | 2 | | | 2 | 1 | 13 | 1 |
| New Hampshire | | | 1 | | | 1 | |
| Vermont | | | | 90 | 1 | | |
| Massachusetts | 2 | | | 106 | | | 1 |
| Rhode Island | | | | 5 | | | |
| Connecticut | | | 1 | 8 | 1 | 50 | 2 |
| **Middle Atlantic** | 6 | 1 | 7 | 951 | 20 | 182 | 31 |
| New York | 4 | 1 | [1] 1 | 394 | 4 | 68 | 23 |
| New Jersey | | | 6 | 115 | 3 | 55 | 3 |
| Pennsylvania | 2 | | | 442 | 13 | 59 | 5 |
| **East North Central** | 11 | 2 | 84 | 1,287 | 14 | 128 | 3 |
| Ohio | 6 | | | 308 | 6 | | |
| Indiana | | | 24 | 46 | 1 | 12 | 2 |
| Illinois | 5 | 2 | 1 | 273 | 6 | 76 | 1 |
| Michigan | | | 1 | 190 | | 10 | |
| Wisconsin | | | 58 | 170 | 1 | 30 | |
| **West North Central** | 10 | | 12 | 578 | 6 | 132 | 9 |
| Minnesota | 2 | | | 69 | 2 | 2 | 1 |
| Iowa | | | | 3 | 1 | 1 | 1 |
| Missouri | 5 | | | 196 | 1 | | |
| North Dakota | | | 12 | 5 | | 123 | 2 |
| South Dakota | 1 | | | 21 | | | 3 |
| Nebraska | 2 | | | | | | 1 |
| Kansas | | | | 281 | 2 | 6 | 1 |
| **South Atlantic** | 28 | 1 | 786 | 295 | 22 | 386 | 16 |
| Delaware | | | | 2 | | | |
| Maryland | | | 3 | 5 | 2 | 28 | 2 |
| District of Columbia | | | 1 | 15 | | 25 | |
| Virginia | 3 | | 511 | 157 | 3 | 127 | 2 |
| West Virginia | 3 | | 202 | 15 | 1 | 13 | 2 |
| North Carolina | 9 | | | 47 | 4 | | 5 |
| South Carolina | 4 | | 35 | 9 | | 22 | |
| Georgia | 7 | 1 | 34 | 42 | 6 | 171 | 3 |
| Florida | 2 | | | 3 | 6 | | 2 |
| **East South Central** | 29 | 1 | 54 | 232 | 9 | 59 | 12 |
| Kentucky | 2 | | 6 | 133 | 3 | 22 | |
| Tennessee | 6 | | 32 | 50 | 4 | | 6 |
| Alabama | 14 | 1 | | 3 | 1 | | 3 |
| Mississippi | 7 | | 16 | 46 | 1 | 37 | 3 |
| **West South Central** | 28 | 1 | 577 | 829 | 13 | 588 | 19 |
| Arkansas | 6 | 1 | 363 | 162 | 2 | 44 | 1 |
| Louisiana | 1 | | 2 | 3 | | 41 | 4 |
| Oklahoma | 4 | | 212 | 111 | 4 | 32 | 1 |
| Texas | 17 | | | 553 | 7 | 471 | 13 |
| **Mountain** | 1 | 1 | 324 | 343 | 2 | 107 | 9 |
| Montana | | | 31 | 7 | | 8 | 1 |
| Idaho | | | 20 | | | 6 | 1 |
| Wyoming | | | | 7 | 1 | 1 | 1 |
| Colorado | | 1 | 7 | 206 | | 53 | 2 |
| New Mexico | 1 | | | 6 | | 7 | 2 |
| Arizona | | | 266 | 58 | | 32 | |
| Utah | | | | 52 | 1 | | 2 |
| Nevada | | | | 7 | | | |
| **Pacific** | 4 | | 3 | 638 | 7 | 29 | 33 |
| Washington | 1 | | | 281 | | 3 | 5 |
| Oregon | | | 3 | 21 | | 26 | 5 |
| California | 3 | | | 336 | 7 | | 23 |
| Alaska | | | | | | | 1 |
| Hawaii | | | 2 | 2 | | | |

[1] New York City only.
*Anthrax:* New York, 1 case.

## Reported Cases of Selected Communicable Diseases: United States, Week Ended Jan. 6, 1951—Continued

[Numbers under diseases are International List numbers, 1948 revision

| Area | Rocky Mountain spotted fever (104) | Scarlet fever (050) | Smallpox (084) | Tularemia (059) | Typhoid and paratyphoid fever [1] (040, 041) | Whooping cough (056) | Rabies in animals |
|---|---|---|---|---|---|---|---|
| **United States** | | 1,455 | 1 | 10 | 28 | 1,573 | 127 |
| **New England** | | 183 | | | 1 | 293 | |
| Maine | | 19 | | | | 55 | |
| New Hampshire | | 18 | | | | 14 | |
| Vermont | | 7 | | | 1 | 76 | |
| Massachusetts | | 123 | | | | 83 | |
| Rhode Island | | 3 | | | | 52 | |
| Connecticut | | 13 | | | | 13 | |
| **Middle Atlantic** | | 216 | | | 2 | 253 | 28 |
| New York | | [2] 118 | | | | 111 | 22 |
| New Jersey | | 40 | | | | 74 | |
| Pennsylvania | | 58 | | | 2 | 68 | 6 |
| **East North Central** | | 322 | | | 3 | 211 | 11 |
| Ohio | | 72 | | | 1 | 30 | 6 |
| Indiana | | 37 | | | | 25 | 3 |
| Illinois | | 59 | | | 1 | 20 | 2 |
| Michigan | | 128 | | | 1 | 68 | |
| Wisconsin | | 26 | | | | 68 | |
| **West North Central** | | 100 | | | | 44 | 10 |
| Minnesota | | 23 | | | | 16 | 2 |
| Iowa | | 12 | | | | 1 | 6 |
| Missouri | | 32 | | | | 7 | |
| North Dakota | | 1 | | | | 9 | |
| South Dakota | | 1 | | | | | |
| Nebraska | | 5 | | | | | |
| Kansas | | 26 | | | | 11 | 2 |
| **South Atlantic** | | 197 | | 5 | 8 | 266 | 14 |
| Delaware | | | | | | 2 | |
| Maryland | | 16 | | | | 14 | |
| District of Columbia | | 6 | | | | | |
| Virginia | | 41 | | 3 | 5 | 129 | 1 |
| West Virginia | | 9 | | 1 | 2 | 42 | |
| North Carolina | | 83 | | | | 40 | |
| South Carolina | | 16 | | | 1 | 4 | 10 |
| Georgia | | 12 | | | | 27 | 3 |
| Florida | | [2] 14 | | 1 | | 8 | |
| **East South Central** | | 109 | | 3 | 4 | 63 | 23 |
| Kentucky | | 29 | | 2 | | 15 | 11 |
| Tennessee | | 52 | | 1 | 2 | 19 | 6 |
| Alabama | | 19 | | | 1 | 26 | 3 |
| Mississippi | | 9 | | | 1 | 3 | 3 |
| **West South Central** | | 93 | | 1 | 7 | 219 | 36 |
| Arkansas | | 8 | | | 2 | 14 | |
| Louisiana | | 1 | | | 1 | 2 | 1 |
| Oklahoma | | 17 | | 1 | | 18 | 1 |
| Texas | | 67 | | | 4 | 185 | 34 |
| **Mountain** | | 73 | 1 | 1 | 3 | 173 | 1 |
| Montana | | 5 | | | | 21 | |
| Idaho | | 5 | | | | 4 | |
| Wyoming | | 1 | | | | 1 | |
| Colorado | | 17 | | | | 38 | |
| New Mexico | | | | | 2 | 25 | |
| Arizona | | 7 | | | 1 | 84 | 1 |
| Utah | | [2] 38 | | 1 | | | |
| Nevada | | | 1 | | | | |
| **Pacific** | | 162 | | | | 51 | 4 |
| Washington | | 62 | | | | 25 | |
| Oregon | | 29 | | | | 1 | |
| California | | [2] 71 | | | | 25 | 4 |
| Alaska | | | | | | 1 | |
| Hawaii | | 2 | | | | | |

[1] Including cases reported as salmonellosis. [2] Including cases reported as streptococcal sore throat.

# FOREIGN REPORTS

## CANADA

*Reported Cases of Certain Diseases—Week Ended Dec. 16, 1950*

| Disease | Newfoundland | Prince Edward Island | Nova Scotia | New Brunswick | Quebec | Ontario | Manitoba | Saskatchewan | Alberta | British Columbia | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Brucellosis |  |  |  |  | 1 |  |  |  |  |  | 1 |
| Chickenpox | 8 |  | 32 | 1 | 383 | 355 | 40 | 96 | 105 | 155 | 1,179 |
| Diphtheria |  |  |  |  | 5 | 1 |  | 1 |  |  | 7 |
| Dysentery, bacillary |  |  |  |  | 2 | 5 |  |  |  | 3 | 10 |
| Encephalitis, infectious |  |  |  |  | 1 |  |  |  |  |  | 1 |
| German measles |  |  |  | 3 | 17 | 51 |  | 11 | 25 | 108 | 215 |
| Influenza |  |  | 34 |  |  |  | 1 |  |  |  | 35 |
| Measles | 4 |  | 9 |  | 303 | 902 | 59 | 14 | 14 | 60 | 1,515 |
| Meningitis, meningococcal |  |  |  |  | 1 |  | 1 |  |  |  | 2 |
| Mumps | 7 |  | 27 |  | 230 | 337 | 41 | 128 | 241 | 100 | 1,210 |
| Poliomyelitis |  |  |  |  | 1 |  |  | 1 |  | 2 | 4 |
| Scarlet fever | 2 |  |  | 2 | 93 | 34 | 9 | 19 | 55 | 54 | 208 |
| Tuberculosis (all forms) | 5 |  | 5 | 3 | 54 | 15 | 10 | 11 | 2 | 55 | 160 |
| Typhoid and paratyphoid fever |  |  |  |  | 23 |  |  | 1 |  | 1 | 25 |
| Venereal diseases: |  |  |  |  |  |  |  |  |  |  |  |
| Gonorrhea | 6 |  | 21 | 2 | 47 | 57 | 26 | 11 | 25 | 63 | 258 |
| Syphilis | 1 |  | 7 | 3 | 29 | 26 | 2 | 16 | 1 | 10 | 95 |
| Primary |  |  |  |  | 1 | 3 |  |  |  |  | 4 |
| Secondary |  |  |  | 3 | 1 | 5 |  |  |  |  | 9 |
| Other | 1 |  | 7 |  | 27 | 18 | 2 | 16 | 1 | 10 | 82 |
| Whooping cough | 3 |  | 4 | 6 | 126 | 112 | 26 | 1 | 7 | 13 | 298 |

## NORWAY

*Reported Cases of Certain Diseases—October 1950*

| Disease | Cases | Disease | Cases |
|---|---|---|---|
| Diphtheria | 48 | Paratyphoid fever | 2 |
| Dysentery, unspecified | 1 | Pneumonia (all forms) | 2,691 |
| Encephalitis, infectious | 1 | Poliomyelitis | 246 |
| Erysipelas | 401 | Rheumatic fever | 81 |
| Gastroenteritis | 2,861 | Scabies | 1,124 |
| Hepatitis, infectious | 66 | Scarlet fever | 156 |
| Impetigo contagiosa | 2,440 | Tuberculosis (all forms) | 314 |
| Influenza | 6,728 | Typhoid fever | 1 |
| Malaria | 2 | Venereal diseases: |  |
| Measles | 413 | Gonorrhea | 192 |
| Meningitis, meningococcal | 8 | Syphilis | 67 |
| Mumps | 56 | Whooping cough | 1,922 |

# WORLD DISTRIBUTION OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER

The following tables are not complete or final for the list of countries included or for the figures given. Since many of the figures are from weekly reports, the accumulated totals are for approximate dates.

## CHOLERA

(Cases)

| Place | January-October 1950 | November 1950 | December 1950—week ended— | | | | |
|---|---|---|---|---|---|---|---|
| | | | 2 | 9 | 16 | 23 | 30 |
| **ASIA** | | | | | | | |
| Burma | 538 | 531 | 208 | 178 | | 4 | 9 |
| Akyab | 2 | | | | | | |
| Bassein | 3 | | | | | 4 | 9 |
| Kyaukpyu | 2 | | | | | | |
| Maubin | 3 | | | | | | |
| Moulmein | 1 | | | | | | |
| Pegu | 1 | | | | | | |
| Rangoon | 6 | [1] 1 | | | | | |
| Toungoo | 8 | | | | | | |
| India | 137,021 | 17,555 | [2] 1,621 | [2] 184 | [2] 61 | [2] 85 | [2] 106 |
| Ahmedabad | 10 | | | | | | |
| Allahabad | 3 | | | | | | |
| Bombay | [3] 430 | | | | [1] 1 | | |
| Calcutta | 9,162 | 173 | 25 | 17 | 18 | 59 | 68 |
| Cawnpore | 1 | | | | | | |
| Coconada | 2 | | | | | | |
| Cuddalore | 51 | 8 | | | | 1 | |
| Lucknow | 12 | | | | | | |
| Madras | [3] 885 | 144 | 33 | 33 | 14 | | 15 |
| Masulipatam | 47 | | | | | | |
| Nagpur | 71 | | | | | [1] 7 | |
| Negapatam | 98 | 19 | 3 | 3 | 9 | 9 | 8 |
| New Delhi | 125 | | | | | | |
| Port Blair (Andaman Islands) | [1] 2 | | | | | | |
| Tellicherry | 27 | | | | | | |
| Tiruchirappali | 1 | 23 | 4 | 1 | 1 | 9 | 11 |
| Trichinopoly | 1 | | | | | | |
| Tuticorin | 26 | | | 15 | 18 | | 4 |
| India (French) | 1,172 | 45 | 8 | 25 | 21 | | |
| Karikal | 405 | 36 | 6 | 15 | 15 | | |
| Pondicherry | 767 | 9 | 2 | 10 | 6 | | |
| India (Portuguese) | 17 | | | | | | |
| Indochina: | | | | | | | |
| Cambodia | 9 | 6 | | | | | |
| Viet Nam | 15 | | | | | | |
| Giadinh | 3 | | | | | | |
| Rachgia | 1 | | | | | | |
| Saigon | 1 | | | | | | |
| Pakistan | 24,505 | 1,559 | 650 | [2] 171 | [2] 253 | [2] 1 | |
| Chittagong | 186 | | | | | | |
| Dacca | 192 | 3 | | 3 | 2 | 1 | |

[1] Imported. [2] Preliminary. [3] Includes imported cases.

## PLAGUE

(Cases)

| Place | January-October 1950 | November 1950 | December 1950—week ended— | | | | |
|---|---|---|---|---|---|---|---|
| | | | 2 | 9 | 16 | 23 | 30 |
| **AFRICA** | | | | | | | |
| Belgian Congo | 31 | | | | | | |
| Costermansville Province | 15 | | | | | | |
| Stanleyville Province | 16 | | | | | | |
| Madagascar | 76 | 29 | | 4 | | | |
| Rhodesia, Northern | 2 | | | | | | |
| Union of South Africa | 17 | | | | | | |
| Cape Province | 3 | | | | | | |
| Orange Free State | 11 | | | | | | |
| Transvaal Province | 1 | | | | | | |
| Johannesburg | 1 | | | | | | |
| **ASIA** | | | | | | | |
| Burma | 254 | 19 | 1 | | | | |
| Bassein | 1 | | | | | | |
| Bhamo | [1] 4 | | | | | | |
| Henzada | 15 | | | | | | |

## PLAGUE—Continued

| Place | January-October 1950 | November 1950 | December 1950—week ended— | | | | |
|---|---|---|---|---|---|---|---|
| | | | 2 | 9 | 16 | 23 | 30 |
| ASIA—continued | | | | | | | |
| Burma—Continued | | | | | | | |
| Kyaiklat | 34 | | | | | | |
| Minhla | 2 | | | | | | |
| Moulmein | [1] 3 | | | | | | |
| Myaungmya | 5 | | | | | | |
| Myingyan | 2 | | | | | | |
| Pegu | [1] 5 | | | | | | |
| Prome | [2] 1 | | | | | | |
| Pyapon | 3 | | | | | | |
| Rangoon | [1] 8 | | | | | | |
| Yenangyaung | 58 | | | | | | |
| China: | | | | | | | |
| Chekiang Province | 42 | | | | | | |
| Wenchow | [3] 4 | | | | | | |
| Fukien Province | 988 | | | | | | |
| Amoy | 10 | | | | | | |
| Kwangsi Province | [3] 63 | | | | | | |
| Kwangtung Province | 627 | | | | | | |
| India | 40,217 | 1,315 | [4] 78 | [4] 108 | [4] 1 | | |
| Allahabad | [2] 19 | | | | [2] 1 | | |
| Bombay | [1] 5 | | | | | | |
| Calcutta | [1] 3 | | | | | | |
| Cawnpore | 18 | | | | | | |
| Lucknow | [1] 10 | | | | | | |
| Indochina: | | | | | | | |
| Cambodia | [5] 46 | | | | | | |
| Pnompenh | 3 | | | | | | |
| Viet Nam | 121 | 11 | 2 | | | 1 | 1 |
| Phanthiet | 91 | 3 | | | | 1 | 1 |
| Saigon | 1 | | | | | | |
| Laos | 2 | | | | | | |
| Indonesia: | | | | | | | |
| Java | 423 | | | [6] 176 | | | |
| Bandoeng | 6 | | | | | | |
| Djakarta | 3 | | | | | | |
| Jogjakarta | 234 | | | [6] 176 | | | |
| Pakistan | [2] 1 | | | | | | |
| Karachi | [2] 1 | | | | | | |
| Thailand | 56 | | | | | | |
| SOUTH AMERICA | | | | | | | |
| Brazil | 40 | 10 | | | | | |
| Alagoas State | 11 | 6 | | | | | |
| Bahia State | 12 | 3 | | | | | |
| Ceara State | 2 | | | | | | |
| Paraiba State | 5 | | | | | | |
| Pernambuco State | 9 | 1 | | | | | |
| Sao Paulo State: Santos | 1 | | | | | | |
| Ecuador | 27 | | | | | | |
| Chimborazo Province | 4 | | | | | | |
| El Oro Province | 4 | | | | | | |
| Loja Province | 19 | | | | | | |
| Peru | 28 | | | | | | |
| Ancash Department | 3 | | | | | | |
| Lambayeque Department | 2 | | | | | | |
| Libertad Department | 1 | | | | | | |
| Lima Department | 11 | | | | | | |
| Piura Department | 11 | | | | | | |
| Venezuela | 5 | | | | | | |
| Miranda State | 5 | | | | | | |

[1] Includes imported cases. [2] Imported. [3] Deaths. [4] Preliminary figure. [5] Includes suspected cases. [6] Nov. 12 to Dec. 9, 1950.

## SMALLPOX

(Cases; P=Present)

| Place | January-October 1950 | November 1950 | 2 | 9 | 16 | 23 | 30 |
|---|---|---|---|---|---|---|---|
| AFRICA | | | | | | | |
| Algeria | 108 | 7 | | | | | |
| Angola | 270 | | | | | | |
| Bechuanaland | 168 | | | | | | |
| Belgian Congo | 4,114 | 423 | 102 | 53 | 97 | | |
| British East Africa: | | | | | | | |
| Kenya | 12 | | | | | | |

| Place | January–October 1950 | November 1950 | December 1950—week ended— 2 | 9 | 16 | 23 | 30 |
|---|---|---|---|---|---|---|---|
| AFRICA—continued | | | | | | | |
| British East Africa—Continued | | | | | | | |
| Nyasaland | 265 | 17 | 3 | | | | |
| Tanganyika | 4,520 | 50 | | | | | |
| Uganda | 3 | 1 | | | | | |
| Cameroon (British) | 437 | | | | | | |
| Cameroon (French) | 126 | 7 | | | | | |
| Dahomey | 403 | 14 | | [1] 4 | | [2] 68 | |
| Egypt | [3] 6 | | | | | | |
| Eritrea | 1 | | | | | | |
| Ethiopia | 36 | | | | | | |
| French Equatorial Africa | 454 | | | | | | |
| French Guinea | 12 | | | | | | |
| French West Africa: Haute Volta | 217 | 13 | | [1] 4 | | | |
| Gambia | 5 | 1 | | | | | |
| Gold Coast | 254 | 6 | 3 | 28 | 13 | | |
| Ivory Coast | [4] 652 | 12 | | [1] 2 | | [2] 20 | |
| Libya | 2 | | | | | | |
| Mauritania | 1 | | | | | | |
| Morocco (French) | 10 | 5 | | | | | |
| Mozambique | 319 | 21 | | | | | |
| Nigeria | 17,257 | 283 | | | | | |
| Niger Territory | 1,135 | 84 | | [1] 9 | | | |
| Rhodesia: | | | | | | | |
| Northern | 5 | | | | | | |
| Southern | 703 | | | | | | |
| Senegal | 2 | | | | | | |
| Sierra Leone | 32 | | | | | | |
| Sudan (Anglo-Egyptian) | 76 | 4 | 2 | 1 | | | |
| Sudan (French) | 226 | 75 | | [1] 17 | | | |
| Togo (French) | 105 | 16 | | [1] 1 | | | |
| Tunisia | 1 | | | | | | |
| Union of South Africa | 900 | 14 | P | P | | | |
| ASIA | | | | | | | |
| Afghanistan | 390 | 140 | | | | | |
| Arabia | 336 | | | | | | |
| Bahrein Islands: Bahrein | 36 | | | | | | |
| Kamaran Island: Kamaran | [5] 2 | | | | | | |
| Burma | 5,051 | 6 | 1 | 4 | 18 | 2 | |
| Ceylon | [3] 2 | 1 | | | | | |
| China | 777 | 7 | | | | 1 | |
| India | 126,090 | 5,786 | [6] 1,426 | [6] 936 | [6] 345 | [6] 354 | [6] 368 |
| India (French) | 474 | 118 | 34 | 32 | 30 | | |
| India (Portuguese) | 101 | | | | | | |
| Indochina | 332 | 7 | 11 | 10 | 2 | | 2 |
| Cambodia | 89 | | | 6 | | | |
| Viet Nam | 243 | 7 | 11 | 4 | 2 | | 2 |
| Indonesia: | | | | | | | |
| Borneo | 1,065 | 201 | 50 | | | | |
| Java | 7,538 | 118 | 1 | 27 | 19 | 2 | |
| Sumatra | 346 | | | | | | |
| Iran | 305 | 68 | 13 | 18 | 6 | 21 | 10 |
| Iraq | [3] 184 | 36 | 9 | 9 | 5 | 6 | 23 |
| Israel | 16 | | | | | | |
| Japan | 6 | | | | | | |
| Korea (Republic of) | 1,331 | | | | | | |
| Lebanon | [3] 2 | | | | | | |
| Netherlands New Guinea | 3 | | | | | | |
| Pakistan | 16,530 | 1,173 | 451 | [6] 211 | [6] 292 | [6] 9 | |
| Palestine | 95 | | | | | | |
| Straits Settlements: | | | | | | | |
| Singapore | [3] 2 | | | | | | |
| Syria | 15 | | | | | | |
| Thailand | 460 | | | | | | |
| Transjordan | 35 | | | | | | |
| Turkey. (*See* Turkey in Europe.) | | | | | | | |
| EUROPE | | | | | | | |
| Great Britain: | | | | | | | |
| England: Liverpool | [3] 1 | | | | | | |
| Scotland: Glasgow | 21 | | | | | | |
| Greece | 15 | | | | | | |
| Portugal | 1 | | | | | | |
| Spain: Canary Islands | 1 | | | | | | |
| Turkey | 8 | | | | | | |

See footnotes at end of table.

## SMALLPOX—Continued

| Place | January-October 1950 | November 1950 | December 1950—week ended— | | | | |
|---|---|---|---|---|---|---|---|
| | | | 2 | 9 | 16 | 23 | 30 |
| **NORTH AMERICA** | | | | | | | |
| Guatemala | 8 | | | | | | |
| Mexico | 506 | | | | | | |
| **SOUTH AMERICA** | | | | | | | |
| Argentina | 517 | | | | | | |
| Brazil | 98 | 13 | | | | | |
| Chile | 3,588 | | | | | | |
| Colombia | 600 | 2 | | | | | |
| Ecuador | 197 | 40 | | | | | |
| Paraguay | 4 | | | | | | |
| Peru | 2,680 | | | | | | |
| Venezuela | 1,538 | | | | | | |
| **OCEANIA** | | | | | | | |
| Australia: Freemantle | [5] 1 | | | | | | |

[1] Dec. 1–10, 1950. [2] Dec. 11–20, 1950. [3] Includes imported cases. [4] Corrected figure. [5] Imported. [6] Preliminary.

## TYPHUS FEVER*

(Cases: P=present)

| Place | January-October 1950 | November 1950 | Dec. 2 | Dec. 9 | Dec. 16 | Dec. 23 | Dec. 30 |
|---|---|---|---|---|---|---|---|
| **AFRICA** | | | | | | | |
| Algeria | 109 | 3 | | | | | |
| Basutoland | 21 | | | | | | |
| Belgian Congo | [1] 90 | | | | | | |
| British East Africa: | | | | | | | |
| Kenya | 23 | | | | | | |
| Mombasa | [2] 3 | | | | | | |
| Uganda | 2 | | | | | | |
| Egypt | 89 | 3 | | 1 | 1 | | |
| Eritrea | 32 | 3 | | 1 | | | |
| Ethiopia | 1,016 | | | | | | |
| French Equatorial Africa | 5 | | | | | | |
| Gold Coast | 10 | | | | | | |
| Libya: | | | | | | | |
| Cyrenaica | 27 | | | | | | |
| Tripolitania | 71 | | | | | | |
| Madagascar | 2 | | | | | | |
| Morocco (French) | 10 | | | | | | |
| Morocco (International Zone) | 2 | | | | | | |
| Morocco (Spanish Zone) | 6 | | | | | | |
| Mozambique | 3 | | | | | | |
| Nigeria | 1 | | | | | | |
| Rhodesia, Southern | [1] 7 | | | | | | |
| Sierra Leone | [2] 5 | | | | | | |
| Sudan (Anglo-Egyptian) | 5 | | | | | | |
| Tunisia | 59 | | | | | | |
| Union of South Africa | 98 | P | P | P | | | |
| **ASIA** | | | | | | | |
| Afghanistan | 1,303 | | | | | | |
| Burma | [1] 15 | | | | | | |
| Ceylon | 1 | 1 | | | | | |
| China | [1] 20 | | | | | | |
| India | 318 | 3 | 3 | 4 | 1 | | 1 |
| India (Portuguese) | 57 | 19 | | | | | |
| Indochina: Viet Nam | 34 | | 1 | | | | |
| Indonesia: | | | | | | | |
| Java | 6 | | | | | | |
| Sumatra | 1 | | | | | | |
| Iran | [1] 204 | 6 | 1 | 1 | | | |
| Iraq | 131 | | 2 | | | 3 | |
| Japan | [1] 927 | 1 | 2 | | | | |
| Korea (Republic of) | [3] 1,161 | | | | | | |
| Lebanon | [1] 2 | | | | | | |
| Netherlands New Guinea | 2 | | | | | | |
| Pakistan | 99 | 3 | 1 | | | | |
| Palestine | 7 | | | | | | |
| Straits Settlements: Singapore | [1] 8 | | | | | | |
| Syria | [1] 39 | | | | | | |
| Transjordan | 28 | | | | | | |
| Turkey (see Turkey in Europe): | | | | | | | |

## TYPHUS FEVER—Continued

| Place | January-October 1950 | November 1950 | December 1950—week ended— | | | | |
|---|---|---|---|---|---|---|---|
| | | | 2 | 9 | 16 | 23 | 30 |
| **EUROPE** | | | | | | | |
| France | 1 | | | | | | |
| Germany (British Zone) | [1] 2 | | | | | | |
| Germany (French Zone) | 2 | | | | | | |
| Germany (United States Zone) | 3 | | | | | | |
| Great Britain: | | | | | | | |
| England: Liverpool | [2,3] 1 | | | | | | |
| Island of Malta [1] | 35 | 5 | | | | | |
| Greece | 28 | | | | | | |
| Hungary | 4 | | | | | | |
| Italy | 52 | | | | | | |
| Sicily | 41 | | | | | | |
| Poland | 37 | | | | | | |
| Portugal | 2 | 3 | | | | | |
| Spain | 47 | | | | | | |
| Turkey | 174 | 19 | 1 | 6 | 11 | 11 | 5 |
| Yugoslavia | 257 | 7 | | | | | |
| **NORTH AMERICA** | | | | | | | |
| Costa Rica [1] | 17 | | | | | | |
| Guatemala | 32 | | | | | | |
| Jamaica [1] | 30 | 1 | 1 | | | | |
| Mexico [1] | 344 | 5 | | | | | |
| Panama Canal Zone [1] | 6 | | | | | | |
| Puerto Rico [1] | 18 | 1 | | | | | |
| Virgin Islands | 1 | | | | | | |
| **SOUTH AMERICA** | | | | | | | |
| Argentina | 2 | | | | | | |
| Chile | 128 | 6 | 3 | | 6 | | |
| Colombia | 511 | 4 | | | | | |
| Curacao | 3 | | | | | | |
| Ecuador | 297 | 51 | | | | | |
| Peru | 1,089 | | | | | | |
| Venezuela | 133 | | | | | | |
| **OCEANIA** | | | | | | | |
| Australia [1] | 103 | 1 | | | | | |
| Hawaii Territory [1] | 6 | 2 | | | | | |

*Reports from some areas are probably murine type, while others include both murine and louse-borne types.

[1] Includes murine type. [2] Murine. [3] Imported.

## YELLOW FEVER

(C—cases; D—deaths)

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **AFRICA** | | | | | | | |
| Belgian Congo ... C | 1 | | 1 | | | | |
| Stanleyville Province ... C | 1 | | 1 | | | | |
| French Equatorial Africa ... C | [1] 1 | | | | | | |
| Port Gentil ... C | [1] 1 | | | | | | |
| Gold Coast ... C | 16 | 2 | | | | | |
| Accra ... D | [2] 4 | | | | | | |
| Ankobra Ferry ... D | 1 | | | | | | |
| Bogoso ... C | [2] 2 | | | | | | |
| Kade ... C | 1 | | | | | | |
| Oda Area: | | | | | | | |
| Akwatia ... C | [2] 7 | [1] 1 | | | | | |
| Atiankama ... C | 1 | | | | | | |
| Taquah-Aboso ... D | | [1] 1 | | | | | |
| Nigeria ... D | [2] 2 | | | | | | |
| Calabar ... D | [2] 1 | | | | | | |
| Ibadan ... D | [1] 1 | | | | | | |
| Sierra Leone ... C | [2] 2 | | | | | | |
| Koinadugu District ... C | [2] 2 | | | | | | |
| **NORTH AMERICA** | | | | | | | |
| Panama: | | | | | | | |
| Colon ... D | 1 | | | | | | |

See footnotes at end of table.

## YELLOW FEVER—Continued

| Place | | January-October 1950 | November 1950 | December 1950—week ended— | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | 2 | 9 | 16 | 23 | 30 |
| SOUTH AMERICA | | | | | | | | |
| Bolivia | C | 867 | | | | | | |
| Chuquisaca Department | C | [4] 850 | | | | | | |
| La Paz Department | C | [5] 17 | | | | | | |
| Brazil | D | 2 | | | | | | |
| Bahia State | D | 1 | | | | | | |
| Ipiau | D | 1 | | | | | | |
| Maranhao State | D | 1 | | | | | | |
| Colinas | D | 1 | | | | | | |
| Colombia | D | 5 | 3 | | | | | |
| Boyaca Department | D | | 1 | | | | | |
| Chizu | D | | 1 | | | | | |
| Magdalena Department | D | 1 | | | | | | |
| Los Angeles, Rio de Oro | D | 1 | | | | | | |
| North Santander Department | D | 1 | | | | | | |
| Ocana | D | 1 | | | | | | |
| Putumayo Commissary | D | 3 | | | | | | |
| Mocoa Locality | D | 3 | | | | | | |
| Santander Department | D | | 2 | | | | | |
| Cuesta Rica | D | | 1 | | | | | |
| Landazuri | D | | 1 | | | | | |
| Peru | D | 14 | | | | | | |
| Cuzco Department | D | 2 | | | | | | |
| Quincemil | D | 2 | | | | | | |
| Huanuco Department | D | 6 | | | | | | |
| Tingo Maria | D | 6 | | | | | | |
| Junin Department | D | 1 | | | | | | |
| San Ramon | D | 1 | | | | | | |
| Loredo Department | D | 1 | | | | | | |
| Pucalpa | D | 1 | | | | | | |
| San Martin Department | D | 4 | | | | | | |
| Bellavista | D | 1 | | | | | | |
| Juanjui | D | 1 | | | | | | |
| Lamas | D | 1 | | | | | | |
| Tarapoto | D | 1 | | | | | | |
| Venezuela | D | 2 | 1 | | | | | |
| Bolivar State | D | 2 | | | | | | |
| Argelia | D | 1 | | | | | | |
| La Parida | D | 1 | | | | | | |
| Tachira State | D | | 1 | | | | | |
| El Milagro | D | | 1 | | | | | |

[1] Suspected. [2] Includes suspected cases. [3] Imported. [4] Estimated number of cases reported in an outbreak in Asero Province Jan. 1-Mar. 14, 1950. [5] Outbreak in North and South Youngas Provinces.

# Influenza Outbreaks Under Continuing Observation

*Background*

In 1947 the Federal Security Agency and the Department of Defense established a Nation-wide program to study and exchange information about influenza. This program has been conducted by a large number of laboratories collaborating with the Surgeons General of the Public Health Service, the Army, the Navy, and the Air Force.

This is part of a world-wide program sponsored by the World Health Organization to study influenza and to aid health authorities and physicians to control the disease. The World Influenza Center is located in London, England. The United States Influenza Information Center is located at the National Institutes of Health of the Public Health Service in Bethesda, Md. The Center serves as headquarters in this country for collecting and disseminating information concerning influenza throughout the world.

*The Outbreak in England*

The Information Center has been following carefully the influenza situation in England. It appears that the current outbreak started in late December in the northern part of the country, centering around Liverpool. It has increased gradually to the proportions of a sizeable and serious epidemic involving rather large numbers of people. Information received thus far indicates that the epidemic involves northern England mainly, and has not yet spread in any considerable degree to Scotland or southern England.

The substantial increase in deaths from influenza has occurred chiefly among the aged and infirm. For others the character of the disease has in general not been too severe. The type of influenza appears to resemble that which has been encountered frequently in local outbreaks in this country for the past several years

*Spread From Sweden*

From London, the World Influenza Center at the National Institute for Medical Research reported as follows early in January:

"As a not unexpected sequel of the local outbreak of influenza A-prime in Sweden in June 1950, the disease appeared in Scandanavia early this winter, in Denmark in November, in northern Sweden and Norway in late November, and in Sweden generally in December. The Danish strain is an A-prime, apparently identical with that occurring in Sweden in June.

"Late in December, influenza appeared in northern England where a mild form seems to be widespread. Serological evidence suggests that it is type A, but the virus has not yet been isolated. The beginning of the outbreak around Newcastle suggests likelihood of importation from Scandanavia.

"Since Scandanavia and Britain had a low incidence in 1949, while much of the rest of western Europe had much more, it is possible that the reverse will be true this winter and that continental western Europe apart from Scandanavia will suffer but only lightly. Other reports of influenza this year are from Sardinia, Iran, and northern Spain, but no details are available."

The National Office of Vital Statistics of the Public Health Service had not received (as of January 19) mortality data from official sources in England on which fatality rates could be based.

### *U. S. Advisory Committee Statement*

On January 18 the Advisory Committee for the United States in the World Health Organization's influenza study program met at Bethesda in one of its regular meetings.[1] The day following the meeting, Surgeon General Leonard A. Scheele of the Public Health Service telegraphed the 10 regional directors of the Federal Security Agency as follows:

"Localized epidemics of influenza occur at this season in the United States every year. Only occasionally do these localized epidemics become widespread. None has had the characteristics of the 1918 pandemic of influenza. At this time there is no reason to believe that the present epidemic in England necessarily indicates that there will be a serious or widespread epidemic in the United States this year.

"The question of immunization against this outbreak or any outbreak of influenza is not settled. There is no vaccine that we can expect will protect with certainty. However, this situation indicates the necessity for continuing controlled studies of the efficacy of influenza vaccine in man. It is expected that some influenza will appear in the United States but that the disease will be like our recent experiences with influenza.

"Since the greatest part of the mortality results from bacterial

[1] The membership of the Advisory Committee is as follows: For the Surgeon General of the Public Health Service, Dr. Norman Topping (chairman); for the Surgeon General of the Army, Col. Don Longfellow; for the Surgeon General of the Navy, Capt. R. W. Babione; and for the Surgeon General of the Air Force, Maj. L. C. Kossuth. Representing the special regional laboratories (seven in the United States, one in Canada, and one in Puerto Rico) were: Dr. M. F. Schaeffer, Communicable Disease Center of the Public Health Service, Montgomery, Ala.; Dr. E. H. Lennette, California State Board of Health, Berkeley; Dr. A. P. McKee, University of Iowa, Iowa City; Dr. Maxwell Finland, Boston City Hospital, Boston, Mass.; Dr. Irving Gordon, New York State Department of Health, Albany. Also participating in the discussion were Dr. Dorland J. Davis, director of the National Influenza Information Center, Bethesda, Md.; Dr. T. P. McGill, director of the Influenza Strain Study Center, Brooklyn, N. Y.; and Dr. C. C. Dauer, medical advisor, National Office of Vital Statistics, Public Health Service, Washington, D. C.

complications in the respiratory tract, it is recommended that (for patients who have a severe influenza-like illness) appropriate antibiotics be used."

*U. S. Clinical and Laboratory Studies*

Scientists from the Public Health Service and laboratories in New York are studying cases of influenza found among persons arriving by ship from England. Other collaborating organizations are also studying the problem.

*Type A in London*

A cable from the world Influenza Center on January 17 advised that influenza type A virus had been isolated from current cases occurring in London. On January 18, specimens were received by air from London. These are being distributed to appropriate laboratories by the Influenza Strain Study Center in Brooklyn, N. Y. The Strain Study Center operates under the Armed Forces Epidemiologic Board Commission on Influenza, of which Dr. Thomas Francis, Jr., is chairman. The Strain Study Center investigates newly isolated strains of virus for their antigenic characteristics in an effort to discover strains of influenza virus which have superior immunizing potentialities.

*Type A in Spain and Japan*

The Weekly Epidemiological Record of the WHO for January 10, 1951, reports that an outbreak due to influenza virus type A in Spain has been confirmed by laboratory examination. An epidemic of influenza has been reported in Japan, principally in the southern part during the early part of December 1950. Laboratory examinations have confirmed the presence of type A virus in Fukouka prefecture, Yamanashi, and Tokyo.

+ + +

The printing of this publication has been approved by the Director of the Bureau of the Budget (August 10, 1949).

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It contains (1) current information regarding the incidence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

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# Public Health Reports

VOLUME 66 **FEBRUARY 2, 1951** NUMBER

TUBERCULOSIS CONTROL ISSUE NO. 60

**IN THIS ISSUE**



FEDERAL SECURITY AGENCY

PUBLIC HEALTH SERVICE

FEDERAL SECURITY AGENCY
*Oscar R. Ewing, Administrator*

PUBLIC HEALTH SERVICE
*Leonard A. Scheele, Surgeon General*

Division of Public Health Methods
*G. St. J. Perrott, Chief of Division*

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# Public Health Reports

*Vol. 66* • FEBRUARY 2, 1951 • *No. 5*


**—Editorial—**

## An Opportunity for Leadership

In recent years we have been witnessing a steady broadening of the horizons of public health. The emphasis has shifted, to a great extent, from the microbiological effects of disease to the study of man in his socioeconomic setting. This has brought us closer to the roots of individual and family health but it has also made our job more complex and thrust on us many new responsibilities.

Many examples may be cited of the application of this concept to public health practice. The goal for each person suffering from ill health or disability of any kind, for example, is a multiple one. The person must be found, he must be given the best medical treatment that can be provided, he must be physically and mentally rehabilitated, and he must retake his place in society, insofar as possible, by making full use of all his resources. For some, of course, recovery may not come very quickly and when it does come, it may not be complete. Nonetheless, we must be guided by the principle that everyone can make *some* recovery and can be helped toward a sound adjustment. This is not a Pollyanna attitude but a sober realization based on the advances which modern scientific knowledge have made possible.

Almost all the health and social services implicit in such an approach must be made available to the victim of tuberculosis. Early control efforts were based primarily on the fact that tuberculosis is an infectious disease. This was, of course, sound; but it was also limited because it resulted in programs devoted almost exclusively to isolation and bed rest. Now we know that adequate tuberculosis control requires the whole gamut of psychological, social, and economic, as well as medical services.

How can those responsible for tuberculosis control activities make sure that all the elements essential to success become an integral part of the program? Obviously not by attempting to do everything alone. That would not only be unwise and unnecessary, it would be impos-

This is the sixtieth of a series of special issues of PUBLIC HEALTH REPORTS devoted exclusively to tuberculosis control. The special issues began March 1, 1946, and appear the first week of each month. The articles are reprinted as extracts. Effective with the July 5, 1946, issue, these extracts may be purchased from the Superintendent of Documents, Government Printing Office, Washington 25, D. C., for 10 cents a single copy. Subscriptions are obtainable at $1.00 per year; $1.25 foreign.

sible. Obviously not by trusting to luck that various services will reach people when and where they are most needed. That would be a basic neglect of responsibility. Tuberculosis control workers must, however, take an essential role not only in stimulating the development of necessary services but in spearheading the movement toward an *integrated* approach in every community. They must draw upon all the agencies, public and private, medical and social, economic and occupational, in building a strong control program.

One of the important responsibilities of all public health administrators is coordination. The very process of adding new services to make our structure complete creates the danger of getting lost in a maze of isolated fragments. New and specialized services must, of necessity, be parcelled out to the health workers and community agencies best qualified to provide them. The problem then becomes one of fitting the various segments of the program together in the interests of the individual patient. By putting the pieces together we get something more than the mere sum of the parts. We get an approach that is unified and we get a program that sees the patient as a whole person.

Although the teamwork principle is now receiving belated recognition by public health administrators, it is still more honored in the breach than in the observance. In an accompanying article, Drs. Anderson and Blomquist make an eloquent plea for the team approach in tuberculosis control programs. In examining current practices in tuberculosis control, they find the fragmented and "isolationist" approach all too common.

It is quite appropriate that tuberculosis control be subjected to this searching analysis, not because tuberculosis control officers are more remiss than other administrators but because this program can serve as a guide mark to other and newer public health activities. In an era when the chronic diseases and the health problems of the aging are beginning to draw increasing attention, we can profit greatly from the experience of tuberculosis control workers. Tuberculosis has many characteristics in common with such diseases as heart disease, diabetes, and arthritis, as far as program considerations are concerned. These include the prospects of early diagnosis, the important social and economic components, the possibility of extended periods of hospitalization, and the necessity for rehabilitative and restorative services.

Tuberculosis control workers have, step by step, established successful patterns for meeting each of these problems. This is not to say that the nascent chronic disease control program will or should be a replica of tuberculosis control. The infectious nature of tuberculosis sets it somewhat apart from conditions such as diabetes and heart disease.

Nevertheless public health administrators have much to learn from the tuberculosis program, particularly in meeting the socioeconomic problems which are so basic to effective control.

Tuberculosis control has reached the stage where it can lead the way in the whole field of social medicine. Armed with a wealth of technical and administrative experience, tuberculosis control administrators have much to contribute toward the development of effective chronic disease control programs. Their position of leadership will be immeasurably strengthened, however, if they see the tuberculosis control program as a unified whole, rather than as a series of separate segments, and if they put the teamwork principle into practice.

The goal of tuberculosis control must be, as Drs. Anderson an Blomquist emphasize, recognition of the patient as a person and of the program as a coordinated community undertaking. In that way, tuberculosis control can fulfill its promise of trail blazer and road marker for the newer programs in public health.

JOSEPH W. MOUNTIN,
*Assistant Surgeon General,*
*Associate Chief, Bureau of State Services,*
*Public Health Service.*

# Tuberculosis Control: A Total Program

By Robt. J. Anderson, M. D. and Edward T. Blomquist, M. D.*

In the past we have tended to think of the tuberculosis program in segments. We have thought in terms of case finding, medical care, or financial need. We have drawn sharp lines between these segments as if the whole program were divisible like a circle. It is not. There are no sharp lines. The "segments" are not segments but names we have given to activities in an overlapping, interlocking, and really continuous process. It is this total process which must be our concept and which must replace our traditional focusing on fractions of the circle.

It is interesting that we have fallen into this trap in two areas. For years, in tuberculosis, we approached the patient as a pair of lungs. We are learning not to do this any more. We have begun to think of the patient as a total person. We are concerned today not only with his medical problems and ways to meet them but also with his personal problems, his reactions, and his feelings.

Modern medicine knows that unless we deal with the total man we do not meet the problems of his illness. The medical profession—in public health, the health department—is taking the responsibility for leadership not only in recognizing the "patient as a person" but in attempting to marshall the forces that can help him as a person. We find recurring evidences of this kind of medical and public health consciousness. In some places we have eliminated the means test for admission to tuberculosis hospitals. In other places residence requirements have been relaxed. Some departments of welfare try to meet special needs caused by illness and will provide additional money for food or rent or clothing. Also hopeful, in a few places, is the absence of harsh and punitive attitudes in the use of forcible hospitalization for the so-called recalcitrant patient.

As suggested earlier, we are doing better for the individual patient. We are beginning to meet his tangible needs. More than that, we are trying to meet some of his intangible needs, the psychological and emotional problems and the resulting changing personal relationships caused by a crisis like tuberculosis. Health departments are beginning to employ medical social workers to help patients from the moment tuberculosis is suspected. We have found that much personal tragedy and hardship can be averted when the patient's prob-

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lems are recognized soon enough and dealt with before they reach such proportions that the medical treatment is jeopardized.

In some tuberculosis hospitals there are medical social workers giving direct social case-work services to patients and helping them meet their personal problems. We know from experience that when these personal problems are met the patients are able to stay in the hospital and make full use of medical services offered.

Our approach to the individual patient has become more comprehensive because our understanding of his needs has broadened. Now we must, in like fashion, broaden our thinking about the operation of our tuberculosis control programs so that they become the unified and total processes we mentioned earlier.

It is true, of course, that in tuberculosis control we have been severely handicapped by shortages of resources. We have had to worry about paying for X-ray machines, about providing clinic sessions, hospital beds, nurses, laboratory technicians, and medical personnel. We have had to find ways to meet our patients' financial and psychological problems with hospital budgets that hardly pay for pajamas—much less for psychiatrists. We still must develop more effective techniques for vocational rehabilitation, for example, of the semiliterate man who must not go back to heavy labor if he is to stay well.

We are not ignoring these gaps in our techniques and our facilities. They are real—and we must be very earnest about them. There are times when there is no substitute for 10 needed hospital beds. But this paper will discuss—not the need for more facilities, but the possibility of better use of those we have so that tuberculosis control can become an orderly process and not just a conglomeration of case finding, sanatorium care, and rehabilitation.

There can be no doubt that one of the greatest achievements in tuberculosis control within recent years was the development and growth of mass radiography. With the photofluorograph, it is economically sound and entirely feasible to X-ray entire communities. The fact that we can now screen vast population groups in a matter of weeks or months has great significance indeed for the future control of tuberculosis in this country.

In the past several years, the technique of community-wide surveys has been developed. Using this technique, we attempt to X-ray all the adults in a city, not just those in schools or industries or selected neighborhoods. The program is conducted not by one agency, but by joint action of all pertinent groups in the community.

The significance of the community-wide chest X-ray approach, however, is not confined to its speed and comprehensiveness as a tuberculosis screening device, or for that matter, to the numbers of unsuspected cases of tuberculosis it succeeds in revealing within a

community, or the number of sick people who get medical care. What is of far greater significance is the approach to tuberculosis control which the community-wide chest X-ray survey epitomizes—an approach which should operate against the kind of practice which may be found in every part of the Nation.

1. There is the tuberculosis control program in which the health officer or tuberculosis control officer has no part in hospital admissions and discharges although he should be in the best position to know who needs hospitalization and what priority would contribute most to the public health. Or in the matter of discharges, the health department often receives no prior notice that a patient will be discharged from the sanatorium so that proper planning for supervision is palpably impossible. It is a perennial paradox that those who possess the basic information and ultimate responsibility for communicable disease control are not consulted about determinations for patients with tuberculosis.

2. In hospital construction programs the same thing happens. All too often, when States are planning expanded tuberculosis hospital construction, the hospital planning commission does not include representatives of the tuberculosis control program or representatives of the local tuberculosis association.

3. Nursing services too are a severely handicapped segment. Because the division of nursing and the division of tuberculosis are administratively distinct entities within a health department, sometimes even located in different buildings, it becomes exceedingly important that we insure medical supervision, consultation, and easy interchange of information. When medical supervision is lacking and medical policies of follow-up are ill-defined it is inevitable that the public health nurse's services will be dissipated. When there is no medical direction in the selection of cases for home visits, for example, we find staff nurses burdened with pursuing casual contacts while sick patients with positive sputum go without nursing supervision.

When there is insufficient exchange of information, it is clear that all services must be handicapped. Although this applies throughout the program, it seems highly appropriate to mention it in connection with nursing. Not only are nurses checkmated because we do not give them the medical direction they need, but they are exasperated because they know that they have an understanding of the patient and his family problems and half the time we do not realize that they have this information and much of the time we develop no means for them to communicate it to us.

4. The sanatorium suffers too from the lack of coordination and planning, even from extreme isolation sometimes. Often the sanatorium director must make decisions regarding admission, with a minimum of medical information and no information regarding the

patients' personal and family problems. Patients come to the beleaguered sanatorium director totally unprepared for their course of treatment. They are rushed into the sanatorium without the slightest idea of what is to be expected of them or what they can expect of their period of hospitalization. Many enter the sanatorium overoptimistic about their prognoses. They are told to "go into the sanatorium for a month or so and get some rest." These practices make for some of the most serious problems with which the sanatorium director must deal and often lead to the kind of behavior which we who cause it call "recalcitrant." In matters of selective discharge, too, the sanatorium director's decision must sometimes be made without reference to the patient's home situation or general social problem.

5. Perhaps the least utilized resource for tuberculosis control is the social agency despite the fact that its services can contribute materially to our control efforts. It is true that we all remember instances where we attempted to use these agencies and were disappointed because patients did not receive the services we had hoped for, and it is equally true that agencies are frequently hamstrung by appropriations which are pathetically inadequate for community needs. But it is also true that we health workers often do not realistically interpret patients' problems to the agency and do not interpret the agencies to our patients so they can use the agencies effectively. It is essential that in the future we work for more coordinated planning between health and welfare agencies if we are to get the most from our community resources. In our community-wide surveys we have found that efforts toward such coordination are well rewarded, and social agencies gain a new understanding of the problems associated with tuberculosis.

6. And most important is the patient himself. He is confronted by the diagnosis of tuberculosis, beset by fears and anxieties about himself and his family, and overwhelmed by immediate and urgent problems of financing his medical care, providing for his family, and caring for his children. Moreover, he has been told firmly that he is a menace to the community! What has been happening to sick men and women as a result of our lack of direction, our almost haphazard management?

—How soon will the public health nurse learn of the diagnosis so that she will be able to give prompt assistance to the patient and the family?

—How will your sanatorium director know that the young woman on the waiting list who has positive sputum has a young baby and is deeply troubled at the prospect of hospitalization because she sees no way of arranging for satisfactory care for her child?

—Has the social worker in the health department fully interpreted tuberculosis and the needs of tuberculosis patients to the social and welfare agencies in the community?
—Will social resources of the community be called upon to provide available case-work or financial assistance?
—Are policies, rules, and regulations about hospital admission, for example, medically and socially sound?
—What happens to our patients whose needs are unmet largely because they are unrecognized by the persons who are in a position to do something about them?

There are many instances in which lack of coordinated planning between various agencies responsible for patients results not only in lack of full utilization of existing resources for the individual patient, but also results in incomplete tuberculosis control. Actually, agencies can almost nullify each other's efforts. For example, in one community 179 tuberculosis patients are waiting to be admitted to the hospital and the hospital serving the community has several dozen empty beds. This has occurred because the policies regarding medical eligibility and financial payment are restrictive, yet the aim of public health is to hospitalize all sputum-positive tuberculous patients.

In all of this, what is lacking is not a willingness to do the job properly, but a basic failure to grasp the patients' problems and the total process of tuberculosis control. What is lacking is coordination—not only coordination in action, but coordination in planning.

In many communities, it is not at all uncommon to find three separate and totally independent official agencies all responsible for tuberculosis control activities. There will be the public health department, another agency responsible for providing hospitalization for the tuberculous, and still another responsible for providing social assistance to tuberculosis patients and their families. This may be an excellent way to proceed; certainly we are not suggesting one supersized organization for all facets of tuberculosis control. But too often these agencies work separately and independently, each addressing itself solely to the specific problem falling under its own jurisdiction. Nor will we achieve tuberculosis control by adding one activity to another even though we arrive at a long, long list of activities. Tuberculosis control will not be found in the sum of case finding, medical care, and social assistance—it will be found rather in the coordination of these activities, and in the manner in which they are knit together.

In almost every community in the country there are many well-established organizations that are capable of offering both direct and indirect services not only to individual tuberculosis patients, but to the tuberculosis control program itself. We have learned from our experience in surveys that not just official health and welfare agencies, but also many voluntary civic, religious, business, and labor organiza-

tions are not only prepared to share in public health programs—they are in actual fact eager to do so. It is the proper function of an official health agency to stimulate the interest of these many organizations in tuberculosis control and to make them aware of the contribution which they can make to the process. More important, it is the proper function of the official health agency to promote coordinated planning and action among all the agencies and organizations interested in and capable of giving service to tuberculosis patients.

In a chronic, recrudescent disease like tuberculosis, it is particularly important that we think of the total needs for control in terms of the total needs of the individual patient. Certainly, a hospital bed is essential for every case of active tuberculosis. But the provision of hospitals alone is not enough. We must help patients so that they will want to stay in the hospital until they are restored to health and prepared to remain well. Adequate financial assistance will provide support for wives and children and will help fathers to remain in the sanatorium. In like manner, the provision of a housekeeper could keep a family intact, and thus prevent a mother from leaving the sanatorium too soon. And if the provision of social case-work services and necessary vocational rehabilitation and educational services during and after a patient's stay in a tuberculosis hospital will assure his remaining well after his discharge, these services should certainly be provided in order—at the very least—to protect the community's investment in that patient's restoration. In other words, the patient's specific needs must be determined and community resources called upon in an orderly fashion to satisfy these needs directly and promptly. This can come about only through joint consultation, planning, and effort on the part of all the agencies and organizations within a community prepared to meet these needs—even though they can be met only partially.

It has been said often that one of the major problems of public health today is to bridge the gap between scientific knowledge and public health service. In tuberculosis control, coordinated planning and action are the tools which can help most in building that bridge. In attempting to meet the needs of tuberculosis patients, the health department, the sanatorium, the social agency, the tuberculosis association, and all the official and voluntary organizations within a community are actually working toward the common goal of controlling the disease. The effectiveness of each depends in large measure on how well the others discharge their responsibilities. By planning together, by understanding each other's limitations, and by making the best use of the services and facilities each of the agencies is prepared to offer, all will benefit—and the needs of the tuberculosis patients and of the tuberculosis control program as a whole will be more directly and more intelligently met. This would seem to be

an effective way of working toward tuberculosis control in this country.

We must develop in our towns and our cities a central source of direction and planning for tuberculosis control. When this does not exist, the patient is subjected to a complexity of forces pulling and pushing him in every direction. And those things which are most important to him as a human being and most necessary to insure sound medical planning are not necessarily the things that will get attention.

As tuberculosis control activities are conceived and mature, the health department must discharge its responsibility for total planning and direction. We must not only cure the ills of the tuberculosis patient, but provide for his reentry into useful citizenship. The growing up process of tuberculosis control has brought with it many adjunct professions to which the official health department can turn—social service, occupational therapy, vocational counselling—all sharing in this comprehensive program. In the future, let us begin to think of all the pertinent activities in tuberculosis control as inseparable, and let us so administer our activities that they do indeed produce the greatest possible good for each patient and family as they endure the struggle with tuberculosis.

# Community-Wide Chest X-ray Survey

## III. Social Work

By Sophia Bloom, A.M.*

Many efforts have been made to meet the medical problems and some of the personal problems of sick people, but only rarely has a community had, or taken the opportunity to consider and try to meet its social responsibility for health. The community-wide chest X-ray survey offers such an opportunity for one public health responsibility—tuberculosis control. In the survey cities, the efforts to mobilize the social resources of the community help bring together the sick person in trouble and the community which wants to assist him.

In the earlier community-wide surveys, social work was represented through the selection of a social worker, or representative of the council of social agencies, to serve on the executive committee of the survey. Her principal responsibility was to help facilitate the referrals to community social agencies. No formal plans were worked out whereby social work was included as one of the professional services contributing to the overall planning for the total survey, nor were social workers used in the health department and survey activities.

The first time social work as a profession was introduced into a survey organization was in 1947 when the community-wide survey of the District of Columbia was planned. In this program a committee of social workers was set up as part of the formal survey organization. This committee concentrated upon two major questions: (1) the existing and new ways in which the social agencies of the community could help meet the needs of patients and their families, and (2) the contribution social work could make through community planning for a major health program. In other words, just as medicine has a responsibility to the total health of the community over and above caring for patients, and just as nursing has a community responsibility, what is the overall responsibility of social work?

As a result of the efforts of the Washington group a basic pattern of social work in community-wide surveys emerged. The pattern of social services has since been modified and expanded in each community in accordance with particular needs, but the basic structure remains the same. It is this structure, service, and philosophy which the following sections will describe.

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*Chief Medical Social Consultant, Division of Tuberculosis, Public Health Service.

*The Presurvey Period*

When the local official health agency considers having a survey, ways to meet the social needs of the patients who will be discovered are explored as part of the presurvey planning.[1]

In all communities there have been, to a greater or lesser extent, attempts to evaluate and deal with the social problems of people in need, and public and private social agencies have long been concerned with these problems. The services provided reflect both the community's understanding of, and its ability and willingness to meet, the health and social needs of its people.

Health departments have daily faced the problems caused by illness in the lives of individual patients, and hospitals bear a share of the social dislocations created or aggravated by tuberculosis. The health and social welfare agencies, in dealing with patients and their families, have had to do so in terms of the law, regulations, and attitudes of the community. The need to know these factors is not created by the survey; this need exists whether or not there is a survey. However, the survey, because of its scope, precipitates an immediate opportunity for pulling together the existing information so that the survey planners may have the benefit of all available information about the social potentials of the area, its resources, its lacks, its plans and trends. Over and above facts or figures, what is of utmost importance to the survey planners is the community attitude toward its responsibility for the people.

A medical social consultant from the Division of Tuberculosis visits the city to pull together the kinds of information listed below:

1. Health and medical programs—general and specific, related to tuberculosis.
2. Laws and regulations affecting the eligibility of the tuberculous for medical care and public assistance, such as means tests, residence requirements, administrative policies on hospital admissions.
3. Local social resources and present social agency structure in the community, including public assistance, public child welfare, medical and psychiatric social services, private family and children's services, and other social services. Adequacy, coordination, and standards of such services.
4. Special programs or provisions for the tuberculous, or others from which the tuberculous may benefit (e. g., vocational rehabilitation services, social insurance, disability insurance, special financial assistance).
5. Sociological data—culture patterns and trends, minority groups, current intergroup relationships.

[1] For a description of survey planning *see* Community Wide Chest X-ray Survey. I—Introduction. Pub. Health Rep 65 1277–1291 (October 6,) 1950.

6. Major medical social problems of the tuberculous (e. g., discharge against advice, bed shortages, financial assistance, etc.).

7. Number and location of medical social workers, scope of activities and quality of medical social services in medical settings where tuberculous patients are being served, including the health department.

8. Number of tuberculous patients receiving social services, sources or types of such services, and adequacy of coverage.

9. Methods of correlating medical and social planning and care.

10. Relationships between medical social work and other professional groups within and outside the health department.

11. Methods of handling social problems in the absence of social services in medical diagnostic and treatment centers and health department.

12. Research projects, completed or anticipated, relating to the social factors in tuberculosis, and potentialities for other studies.

13. Trends or definite plans for development of the community social resources.

14. Other special factors which might affect the survey.

This presurvey period, if so utilized, can offer a genuine opportunity for consideration of mutual problems and for joint planning between the health, medical, and social agencies, and the doctors, nurses, and social workers. Good coordination between the social agencies and health and medical care facilities and among the social agencies themselves will mean a more effective total service to the people of the community. The community must ask itself whether it will take advantage of the opportunity offered by a community-wide program to plan for extension of needed services.

In one large community presurvey discussions were held with more than 25 people from Federal, State, and local agencies: public health officials, tuberculosis control officers, State health department social workers, medical social workers in tuberculosis agencies and in other medical settings, public assistance and child welfare workers, social workers in the community, schools of social work, veterans administration, social workers from professional organizations, rehabilitation workers, administrators, welfare council representatives and tuberculosis association representatives. It became clear that these people were keenly aware of the tuberculosis problems; many undiscovered patients, a bed shortage, a severe housing shortage, inadequate public assistance, inadequate child care facilities, insufficient medical social case-work services, differing admission policies among the tuberculosis hospitals so that some patients were not eligible for admission anywhere.

There was great strength and forcefulness in the medical, public health, and social work leadership in that community. Determined efforts had been made for years to deal with the problems, and many

people looked forward to the possibilities offered by the survey to find the unknown patients, and to meet the specific medical and social needs of the tuberculosis population. In other words, the local people were prepared to use the survey not only for the immediate benefits to be gained by case finding, but to help them plan to meet the long-time health and social problems revealed in a major community health program.

### *The Public Health Service Medical Social Consultant*

The medical social consultant of the Public Health Service participates in the early planning of the survey and is available throughout the program. She serves in an advisory capacity to the health department and helps State and local health departments, tuberculosis associations, and community social workers work out plans to mobilize community social resources and develop any additional needed social services for the tuberculosis control program and the survey. She brings to them the experiences gained in previous surveys.

### *The State Medical Social Consultant*

In most of the States there are medical social workers in one or another of the State health or medical care programs. Their customary consultative relationships with local areas have made it possible for them to contribute greatly to the local program, and the Public Health Service consultant works closely with them. They serve on various social work committees of the survey and help particularly with overall planning. In a number of States, they have assumed considerable responsibility for helping the social worker in the local health department in the development of the service.

### *Social Work Coordinator*

Because of the many survey interests and activities of the social workers in the community, it is essential, especially in the larger communities, that some one social worker be designated to coordinate the social service activities involved in the case-finding program including those in the health department, retake center and community. This may be a social worker from an official or other agency. On one occasion a medical social worker from the Division of Tuberculosis was assigned as the coordinator. The full-time services of one person may be required if the community is large.

### *Social Work in the Survey Organization*

Social work functions in the survey as part of the professional services division of the survey. This division is concerned with the pro-

fessional services offered to persons discovered in the survey. As the survey is of short duration but intense activity, additional services, particularly contributions of service by persons outside the official health agency, are required. The professional services division is responsible for stimulating these contributions. It helps set the professional standards of the survey and is responsible for interpreting it to the various professional groups involved. It is generally agreed that joint thinking and planning of the three professional groups involved—medical, nursing, and social work—will result in greater coordination of community services and in more effective services for the individual in need of help. It is in this regard that the professional services division can be very effective when joint medical, nursing, and social work considerations are brought together and merged into the overall problem of adequate care for tuberculosis patients and their families.

Social work is represented in the professional services division by a social work committee. Since no one professional organization represents all the social workers, the health officer calls together representatives of the various social work organizations such as the Council of Social Agencies, schools of social work, key social agencies, and the social workers in the State and local official health agencies, explains the program and asks them to choose the chairman and vice-chairman. This original temporary group then dissolves and the newly appointed chairman and vice-chairman (usually one medical social worker and one social worker from another field) appoint the social work committee consisting of social workers from public and private social agencies, hospitals, and other health and medical settings, all of whom have a contribution to make to the tuberculosis control program of the community. The committee varies in size, each community choosing the number it finds is appropriate; membership has ranged from 13 to 54. This over-all social work committee of the survey can be used in an advisory capacity by the health officer if he wishes.

The social work committee is responsible for the effective mobilization of the social workers of the community but needs the help of the health department and the rest of the survey organization. The health officer, the tuberculosis control officer, the public health nurses, the survey program manager, the health educators, the survey publicity representatives all contribute, together and individually, to the social workers' knowledge of the total program and to their understanding of the ways in which the health department functions. As social workers become familiar with the objectives of the tuberculosis control program and the methods by which the tuberculosis control officer hopes to achieve control, and as they learn how the problems are dealt with, they begin to see their own roles more clearly.


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Moreover, the growth of understanding is mutual. The health workers and the lay people in the survey organization learn more of the objectives, methods, and problems of social work and utilize the social workers in other phases of the survey program, such as community organization. In the survey cities greater mutual understanding and coordination between the health agency and the social agencies has developed as a result of joint activities. A number of health officers have expressed gratification for the support given them by the social agencies; and, in turn, the social workers feel that they have a part in the health program. In several cities, after the survey, the health divisions of the Councils of Social Agencies have developed permanent committees of social workers interested in the health programs of the city.

The committee as a whole considers specifically the social needs of tuberculosis patients and families, determines whether there are sufficient resources for the patients who will be discovered in the survey, points out gaps in services and helps with recruitment of social work personnel for the health department and the retake center. The social workers in the health department and retake center can bring to the committee data on social problems of patients which because of the number involved will throw greater light on the total problems of the community. The committee is in a position to focus the attention of the social workers in the community and other professional and lay groups on the specific medical-social problems which the survey emphasizes.

*Social Work Subcommittees*

There are usually a number of subcommittees of the social work committee. These vary with situations in the survey cities and with the specific needs that arise as the survey progresses. The chairman of the social work committee appoints the chairmen of the subcommittees, and their membership may be drawn from the full committee or include other social workers from the community. Sometimes the chairmen of the subcommittees serve with the chairmen of the social work committee as a steering group, so that it is not necessary to have frequent meetings of the full membership. Long-range planning to meet community needs revealed by the survey is, of course, a function of the full committee, but preliminary work on it can be handled by the steering group. In every city, however, there has been a subcommittee on interpretation, which has had responsibility for bringing to the social workers of the community facts about the survey, facts about the control of tuberculosis, and suggestions as to the role social agencies can play. This committee informs social agencies about the program, provides social workers for neighborhood committees and for the speakers bureau, and helps develop some of the publicity

materials—press, radio, television—on social needs so that the community will learn more about them. One of its important responsibilities is to sponsor an institute in which the social workers in the community can learn more of the medical and social factors in tuberculosis. An example of this kind of institute is the program sponsored by the Greater Cleveland Chest X-ray Survey Foundation. Many of the agencies in the city operated with skeleton staffs for the day so that all the social workers could attend and there would have to be only one meeting instead of many small ones. In most of the communities the institute follows this general pattern.

Subcommittees to consider problems requiring further study have been established in every survey. Consideration is given to the effect on tuberculosis patients and tuberculosis control of such matters as:

1. Adequacy of local public assistance allowances.
2. Adequacy of provision for child care and housekeeping services.
3. The residence laws.
4. The means test.
5. The effects on patients of long waiting periods for beds.
6. Problems of the single, homeless person.
7. Emotional factors contributing to acceptance or rejection of the diagnosis.
8. Financial factors contributing to refusal to enter the hospital.
9. Effects of disciplinary discharges from tuberculosis hospitals.
10. Vocational needs of patients.
11. Income of patients.

There have also been subcommittees appointed to carry out certain other responsibilities like the compilation of a list of social agencies available for tuberculosis patients, indicating the specific kinds of services offered, recruitment of social work personnel, pointing out gaps in services.

As in all the survey committees, activity among the social workers is great during the planning of the survey and during its operation. Considerable enthusiasm and excitement are engendered. Committees, large and small, meet frequently and spend hours working out problems and outlining procedures. That the range of interests is broad is indicated by the subjects and reports described in the minutes of one meeting of a social work committee.

1. A statement of social needs of patients with a list of social resources—to be included as part of a larger statement of medical, nursing, and social information to be printed in the local medical journal.

2. A letter containing current reports on the survey, such as the number of persons X-rayed, and current social work activities to be sent to all social agency executives in the area.

3. A presentation by the health department social workers of some of the social needs as revealed in the health department activities.

# MEDICAL and SOCIAL ASPECTS of TUBERCULOSIS

**10:15—Significance of the X-Ray Survey For Our Community**

Deon Donald V. Wilson,
Chairman Social Services Committee

**10:30-11:30—Tuberculosis—As the Doctor Sees It**

Dr. Myron M. Perlich,
Instructor in Medicine, Western Reserve Medical School,
Visiting Staff Physician, Cleveland City Hospital

Dr. Perlich will discuss the diagnosis of tuberculosis. He will review the most recent treatment methods, including surgery; care of patient before, during and after hospitalization; the doctor's use of the social worker, the public health nurse and rehabilitation resources; and chances of infection both for members of the family and to the social worker.

**11:30-12:30—Tuberculosis—The Role of the Public Health Nurse**

Miss Lucia Sweeton,
Ass't Professor, Frances Payne Bolton School of Nursing,
Western Reserve University

Miss Sweeton will discuss the procedures of the Public Health Department and the Public Health Nurse, including care of the patient waiting for hospitalization; interpretation and follow-up with the family; instruction in isolation techniques and their application to the social worker; continuing service to the patient and family upon patient's return home.

**2:00–3:00—Tuberculosis—The Emotional Aspects**

Dr. George A. Streeter,
Teaching Fellow in Psychiatry, W. R. U. Medical School

Dr. Streeter will discuss some of the more personal problems and emotions of the patient. Such topics will be considered as the patient's initial reaction to his tuberculosis, difficulties in accepting bed rest therapy and the readjustment problems of a prolonged disability.

**3:00–4:00—Tuberculosis—From the Standpoint of the Social Worker**

Miss Mary E. Hartzell,
Medical Social Worker, Greater Cleveland
Chest X-Ray Survey Foundation, Inc.

Miss Hartzell's discussion will center about the impact of the diagnosis of tuberculosis on the patient; the social and emotional adjustments which must be made if the patient is to complete successfully a long hospitalization and convalescent period; the clinic and hospital social worker's cooperative work with the public health nurse and social agencies in the community; resources available for use with the tuberculosis patient; the importance of rehabilitation work in the maintenance of the patient's physical and mental health and in his restoration to useful function in the community.

4. Report of social work activities in the retake center.

5. Publicity to be released to the newspapers, radio and television on social aspects of tuberculosis.

6. Discussion of a proposed study project on unattached men and women.

*Social Services in the Health Department*

An increasing number of local health departments are employing social workers to serve patients. This number, however, is still limited and in most of the communities in which chest X-ray programs take place, social service has not yet been established in the health departments. Our discussion here is concerned with those health departments which have not had social services before.

During the planning period for the survey the social problems of tuberculosis are discussed with the health department officials, the experiences of other survey cities are examined and the health officers have time and opportunity to decide how they wish to initiate social services for tuberculosis patients and plan for service through the follow-up period. Recruitment begins early so that the service may be started as far ahead of the survey as possible. This enables the health department to set up an administrative structure and enables the social worker and others in the health department to clarify functions and work out procedures and methods. Because the survey is tuberculosis case finding, social service is usually started in the tuberculosis division of the local health department. Care is always taken to so organize that later extension of service for other diagnostic groups is possible and expansion into a social service department is feasible.

Social workers for health departments have beeen secured by various means. Some are employed by local health departments, some with survey funds, others have been loaned by State health departments and, in two cities, the local tuberculosis association has provided funds. Medical social consultants from the Public Health Service are loaned upon request and on one occasion the National Tuberculosis Association made one of its social workers available. In some of the surveys only one social worker has been available at a time; in others there have been as many as six on the staff.

The problems confronting the social workers who are starting service in the local health department in preparation to the tuberculosis surveys are essentially no different from the problems involved in initiating social service in a local health department at any time, except for the necessity of preparing for the immediate survey case load. After the social worker comes, there are additional conferences within the health department, again with the health officer, the tuberculosis control officer, and the director of nursing. During

these discussions there is clarification of the needs of the patients served by the health department and a beginning is made toward the determination of the ways in which the social worker will function. Because the service is new, flexibility in development is essential. Basic principles of social work are discussed and an administrative structure is established. One of the purposes of these conferences is to try to determine the kinds of social problems with which various people in the health department have already been dealing and the ways in which the social workers can help. The health department physicians, social workers, and nurses together arrive at a mutual understanding of how social service can add to the services already given by the health department and try to delineate the specific functions and various activities of the social workers. It is usually determined that the social worker will offer social case-work services to patients and families and consultation services to other health department personnel and to the community social agencies.

Administratively, the social workers are always responsible to the physician in charge of the division of tuberculosis for the work in the tuberculosis program. In most of the survey cities, the health officers have taken considerable responsibility in the development of overall policies which will influence further social service developments in the health department.

Usually, a statement of the functions of the clinic social worker is worked out. There is no set pattern and the functions are adapted to each clinic. The following kinds of services are usually included:

1. *Social Case Work*

The social workers give direct case-work services to patients who need help with those social, emotional, and financial factors which affect their ability to accept the diagnosis and to follow recommendations for medical care. The following are thumb-nail examples of the kinds of problems requiring social case-work service:

*Acceptance of the diagnosis*

The social workers have found that, along with the doctors and nurses, they must devote much of the first interview or interviews to consideration of the patient's fears about himself— fear of death, of physical deformity and crippling, of permanent incapacity. After patients are given ample opportunity to release their emotions and to gain reassurance, the related social problems such as the need for financial assistance or planning for the care of children are more easily faced and solved.

*Hospitalization*

They have also found it necessary to deal with the factors creating resistance to entering the hospital. A certain amount of resistance is, of course, normal but some patients require help in working their way through the mixture of reactions of fear, resistance and acquiescence so that they can come to the decision to enter the hospital and can find the way, with help from the clinic social worker or community agencies when necessary, to care for their children, make financial arrangements, etc.

*Financial problems*

The social workers in the clinics often devote much time to helping patients and their families plan to meet the severe financial strains caused by tuberculosis Some need immediate referrals to public assistance agencies; a large number of tuberculosis patients, it has been found, do not apply for such aid, and, indeed many are not eligible. Because of the disaster created in the majority of families, patients need a great deal of help to face the necessary readjustments, such as reduced living standards, curtailment of education, employment of wives and children, and the necessity to seek relief. Much time may be required before patients can make the practical and emotional adjustments necessary to enable them to enter hospitals or follow other medical recommendations.

Along with the actual cost of maintaining their families, many patients must meet some of the costs of hospital care. Although there may be efforts to rate patients according to ability to pay, the sum charged may be more than the patient can handle, especially over a sustained period of time. Some people, when frightened and unaware of the length of time required by treatment, will agree to almost any charge. To be certain that the illness is understood and that plans are not made on the basis of 6 months when it is more likely that 2 years will be required, social workers help patients with the necessary planning. Much bitterness among patients and much leaving hospitals against advice can be prevented when patients have an opportunity to absorb the impact of the diagnosis at the beginning and to plan in terms of reality.

*Residence laws*

In all but a very few of the States these laws are a genuine source of difficulty to the patient, to the health department, to the hospital, to community social agencies, and to the control of tuberculosis. If the nonresident patient has legal residence in his former home the social worker can help him accept the necessity of returning there for treatment. Sometimes the social considerations along with the patient's medical needs and the community's public health responsibility, make it possible for the responsible authorities to waive the residence requirements. On occasion, nonofficial hospitals will admit the patients. Sometimes, especially when the patient has no place of residence, he can receive no medical care until a year or more has passed. During this period, he often needs considerable help from community social agencies.

2. *Cooperation With Community Social Agencies*

Although all the patients referred to the social workers have social difficulties which are intertwined with the illness and therefore need some help in the medical setting as part of the medical treatment, others need additional social services from other agencies. Bed shortages can create the need for additional social resources. For example, when sick people must remain at home, it is often necessary to remove the children, sometimes to foster homes and institutions.

In the survey cities up to one-third of the patients have been referred to other agencies for services. In one city the range of services required by patients necessitated the use of the following agencies:

Vocational Rehabilitation
County Tuberculosis Hospital—Social Service
County Welfare Department
Family Society
Juvenile Court
Guidance Council
Mental Hospital
Three other County Health Departments
Marine Hospital
Social Security—Old Age
Four Local Health Departments in other States
Social Service Exchange
Urban League

| | |
|---|---|
| Veterans' Administration | Public Welfare Department |
| Tumor Institute | Children's Home |
| Visiting Nurse Society | St. Vincent de Paul Clinic—Social Service |
| County Veterans Aid Bureau | Catholic Church |
| American Red Cross | Catholic Children's Bureau |
| Disabled American Veterans | Municipal Court |
| Convent of Good Shepherd | Memorial Hospital |
| County Hospital | Medina Children's Service |
| County Health Department | Traveler's Aid |

The social worker in the health department develops a close working relationship with other social agencies in the community. At times she functions by bringing to them an interpretation of the medical conditions and the social factors involved. By dealing with the patients from the point of diagnosis, referrals to community agencies are made earlier and some further social strain is prevented. The social agencies in turn learn through these experiences to use the health department more effectively for all the people under their care.

3. *Consultation Services*

In addition to giving direct services to some patients, the social worker also functions as a consultant to other health department personnel. As pointed out earlier, she deals directly with a limited number of patients, those who by the nature of their medical problems and the related social situation particularly require a specialized social case-work service. Very often, the social worker is used by other staff members in a consultative capacity. At times this is in relation to over-all administrative policy; at other times, it is in relation to specific patients.

In some clinics, the tuberculosis control officer calls case conferences at intervals to discuss individual patients. Doctors, nurses, and social workers have an opportunity to think and plan together for the patient's benefit. These are the more formal conferences. In every clinic there is, every day, a constant informal exchange of information and thinking. This is essential, so that the patients can receive the most effective help.

4. *Collection of Social Data*

In addition to dealing with the individual patient, the social worker in the clinic has the means of collecting the social data which the community can use to develop additional resources. Community needs may be highlighted. The health department is in a particularly strategic position to acquire the data as many patients pass through its doors, either for some kind of medical service or on the way to the hospital.

The problem of single people, particularly men, is an example of this kind of activity. Community attitudes toward the single, unattached people, particularly the men, vary and are frequently hostile. It seems to be generally assumed that the single person can draw upon unknown intangible resources, and should be able to get along somehow. In public assistance programs, for example, there are often provisions which set up different standards for the single person as opposed to the rest of the population. It is frequently harder for him to prove his need and he often receives less than other people. In the tuberculosis field, single men are often assumed to be, and said to be, the most irresponsible and socially undesirable segment of the total population—the wanderers, the alcoholics, the feebleminded; and they are often believed to refuse hospitalization. Reports from social workers in various surveys show that, in fact, the single men are often eager, because of their homelessness and need of care, to enter the hospital. In one survey city nearly 60 single men, most of them from the skid row area, were inter-

viewed. Almost all entered the hospital. Reports from doctors and social workers in many tuberculosis hospitals show that the single homeless people are among those who find it hardest to leave the security and protection of the hospital. Data such as these can enable a community to approach the problems of sick, homeless people more realistically.

Even before the arrival of the social worker certain essentials in the physical setting are considered. Privacy for interviewing is very necessary. A private telephone is also an essential. Adequate secretarial assistance is essential because much of the value of social case work is lost unless it can be transmitted quickly in usable form to others: the doctors, the nurses, the hospital or clinic caring for the patient, and the other social agencies. Face sheets are developed so that social data may be systematically gathered and kept. Records are usually written in descriptive form. The records need not necessarily be long, but they must be adequate to meet the needs of the patient, and the medical and social personnel caring for him. Conversations between the social worker and the doctor or nurse will not meet this need, as the risk of losing the continuing value of the material is great.

Patients are usually referred to social service by the clinic physicians, clinic nurses, public health nurses in the field, private doctors, the community agencies, and others. Some come on their own initiative. In most surveys, the doctors are the principal source of referrals, with the nurses the second largest source. The use of the social workers by other personnel in the clinic increases steadily as experience begins to show the kinds of services that are given and as others begin to see how this service fits into the total tuberculosis control program.

Priorities for services must be established because of the size of the survey load and because there are usually not enough social workers in the clinic. For example, it may be agreed within the clinic that social workers will see all the newly diagnosed patients and all of those for whom hospitalization is recommended. These two groups are usually given priority because it is obvious that among the newly diagnosed and among those who are to go to the hospital there are many personal problems. Adequate attention paid to these problems at the start will cut down resistance to entering hospitals or refusal to follow medical recommendations. Social service, however, is not restricted to these two groups and is available for other patients referred by doctors, clinic nurses, field nurses, other clinic personnel, and outside agencies. Often patients who know of the service will come themselves to ask for help.

In many clinics, after the doctor sees the patient he sends him to the nurse and then to the social worker. This is not necessarily a set pattern, and at the discretion of the doctor or nurse or the wish of

the patient, the social worker may be called in at any time. The doctor explains the reason for referral to the patient and makes the referral to the social worker in person so that the social worker has the opportunity of learning what social problems he believes require attention. The start of joint medical-social thinking about the patient takes place at this time.

The length of time necessary for interviews and the number of interviews required per patient cannot be standardized. Many social workers estimate that approximately an hour should be set aside for the first interview with the patient. Sometimes less time is actually used, on other occasions more may be necessary. With some patients one interview is enough in which to gain an understanding of the patient's problem, his attitudes toward his problem and the effect of this on his social situation and to help him begin to make his plans. In other instances more than one interview is necessary. There are some patients whose understanding and acceptance of the diagnosis and the demands it makes upon them in terms of hospitalization, jobs, and families is such that they can begin to chart their courses relatively quickly. Others, whose fear and uncertainty is greater, need help for a longer period. Sometimes it is necessary to see these patients more than once and it may be necessary to speak with relatives.

On occasion, home visits are needed. This is comparatively infrequent but again circumstances indicate the need. In a health department which serves primarily an urban community where transportation is good and where people have easy access to the clinic most of the interviews can be conducted in the office. If the health department although located in a city serves a rural area also, it may be almost impossible for a wife to arrange for the care of small children during the day while she takes a trip of many miles. In such an instance, the social worker goes to the home. On other occasions, too, the social worker may feel that an interview with the patient and his family in his own home may be more productive and may give her a better understanding of the whole situation than she can get in clinic interviews. This is particularly true where there have been indications that the interpersonal relationships between the family members are disturbed. Because the sick person is so dependent upon those who are closest to him and because his sense of security or insecurity will affect his attitudes toward the diagnosis and toward the recommendations for medical care, it is often important that the social worker secure sufficient first hand understanding of the family relationships to enable her to help most effectively.

*Retake Center*

The social worker in tuberculosis has worked in a variety of medical settings, as it has been recognized that patients have problems in

different phases of treatment. The needs of the patient who was preparing to return to work were first recognized. Experience with patients at this time pointed out the need for help earlier, at the time the patient was in the hospital. Then, because of the problems which arose in the hospital, it was apparent that there was a place for the social worker earlier, in the clinic where the patient was undergoing diagnosis. Now we are exploring the needs of persons who are suspected of having tuberculosis in order to determine how much social breakdown can be prevented from the very beginning of the long course of treatment.

In the retake center there is medical consideration of the problems of the suspected cancer and cardiac patients as well as the suspected tuberculosis patients. The principal focus of the social workers in the center is in the interest of furthering medical care for those suspected patients who are referred to the social workers by retake center personnel because of specific social and emotional problems.

The problems presented by persons suspected of having tuberculosis are, of course, similar to those already described in the preceding section, with emphasis on anxiety, and occasional need for the services of other social agencies. The experiences with those suspected of cancer or cardiac disease are the same.

This is an example of the way social service functioned for the suspected cardiac patients in one retake center. The State health department provided two social workers for the retake center, primarily for the suspected heart patients, although they also gave service to others. The following outline shows the basis of selection of patients and the kinds of service rendered:

*Persons to be referred to the social worker*

1. Persons who, following the small film, return for confirmatory films or consultation related to suspected cardiovascular disease, and who express marked concern or fear.
2. Persons who need help in finding and using appropriate medical facilities.
3. Specific referrals from private physicians for plans for social care or with the request that a different medical plan be worked out.

*Services provided by the social worker*

1. Effecting a referral to appropriate medical resources in the community.
2. Helping the patient overcome obstacles affecting the medical plan.

    *a.* Discussing with the patient his attitudes, problems within his home, work or school situation, and other factors which affect

adversely his ability or readiness to follow recommendations for diagnostic procedures and treatment.

*b*. Determining with the patient what help he may require through family and community facilities and helping him to make the best possible use of all resources.

*c*. Sharing social information with other professional staff.

## Conclusion

The social needs of the tuberculous cannot be considered as an entity. They stem from and are created by the overall problem of the necessary adjustments of man to his physical, social, and economic environment. Because there has been more and more emphasis in recent years upon the individual needs of people we have learned more about helping them to make satisfying adjustments.

We have learned not to do things "for" and "to" people, and know that we are of genuine assistance only if we help them to help themselves. Although the helping process takes place between individuals, the person who is helping reflects the desire of society to provide for the person in need. However, society must provide not only the person who helps—the doctor, or the social worker—but must also provide the hospital, the foster home, the social agency. Progress is being made in many directions but there are still wide gaps in our social provisions. This has been repeatedly demonstrated by the community-wide surveys.

The continuing economic and social changes of our industrial economy inevitably produce inequity and imbalance; and in our complex modern society, our social customs and laws are not always at the level of our modern scientific knowledge or even with modern social knowledge. We may know, for example, that prompt hospitalization is the best way to care for a person with positive sputum and the best way to prevent further spread of the disease, but our residence laws may prevent us from providing such hospitalization for the sick person who needs it even when we have empty beds in our hospitals. We may know that a man cannot easily rest in bed if he is worried about the deprivations his children suffer because of his illness, but we do not always provide adequate support for them. Medically, a particular program of treatment may be clearly indicated and outlined, but cultural and psychological attitudes about tuberculosis in particular, and dependency in general, may operate against the acceptance of scientific knowledge on the part of both the patient and society.

Our society has conflicts about dependency and people in need. Although we retain some archaic laws and customs, we want to meet the needs of people, to provide for the individual and the group,

medically and socially. Our laws governing health and social welfare, our institutions, our development of public education, our social historical precedents are all evidences of this desire to meet the universal needs of people. But as individual persons, and as a group, we all are subject to many contradictory impulses. We may recognize that a given person needs help; we may provide the means for such help; and we may then think the less of the man who takes it. In a culture which places such a high value on independence, most people, the well and the sick, are not able to set this aside easily and accept dependence themselves, nor see others do so. This is one of the reasons why it is difficult to accept full community responsibility even though we may acknowledge the needs of individuals and even though we know that in our complicated social order no man can be entirely self-sufficient.

In tuberculosis, our responsiblity lies in two areas: first, to provide public health services and second, to meet the social needs of patients. The first is accepted far more than the second. As a result, a very large portion of the social burden has fallen upon the shoulders of the sick and their families and many tuberculosis control efforts are thereby substantially weakened. We must ease the load if our efforts to control tuberculosis are to be fully successful.

ACKNOWLEDGMENT

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# Incidence of Disease

*No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring*

## UNITED STATES

### Reports From States for Week Ended January 13, 1951

*Salmonellosis*

Dr. W. L. Halverson, Director of Public Health, California, has reported an outbreak of salmonella food infection following a family Christmas dinner. Among the 12 persons eating turkey, 11 became ill. *Salmonella anatum* was recovered from the turkey served and from the patients.

*Bubonic Plague in Lea County, New Mexico.*

Dr. J. R. Scott, Director, State Department of Health, New Mexico, has reported a fatal case of bubonic plague in a man in Hobbs, Lea County, N. Mex. The diagnosis was confirmed by laboratory examination. In 1950, two cases of bubonic plague were reported in New Mexico, one of which occurred in Lea County in January.

*Comparative Data for Cases of Specified Reportable Diseases: United States*

[Numbers after diseases are International List numbers, 1948 revision]

| Disease | Total for week ended— | | 5-year median 1946–50 | Seasonal low week | Cumulative total since seasonal low week | | 5-year median 1945–46 through 1949–50 | Cumulative total for calendar year | | 5-year median 1946–50 |
|---|---|---|---|---|---|---|---|---|---|---|
| | Jan. 13, 1951 | Jan. 14, 1950 | | | 1950–51 | 1949–50 | | 1951 | 1950 | |
| Anthrax (062) | ------ | 1 | 1 | (1) | (1) | (1) | (1) | 1 | 1 | 1 |
| Diphtheria (055) | 96 | 205 | 219 | 27th | 3,124 | 4,642 | 6,835 | 217 | 371 | 477 |
| Encephalitis, acute infectious (082). | 7 | 9 | 8 | (1) | (1) | (1) | (1) | 14 | 22 | 14 |
| Influenza (480–483) | 1,788 | 1,658 | 2,331 | 30th | 42,044 | 13,887 | 19,882 | 3,637 | 3,303 | 4,565 |
| Measles (085) | 7,190 | 4,946 | 5,314 | 35th | [2] 41,258 | 27,120 | 34,207 | [2] 12,557 | 7,990 | 8,083 |
| Meningitis, meningococcal (057.0) | 107 | 94 | 94 | 37th | 1,164 | 1,080 | 1,080 | 203 | 167 | 177 |
| Pneumonia (490–493) | 1,558 | 2,262 | ------- | (1) | (1) | (1) | (1) | 3,233 | 4,472 | ------ |
| Poliomyelitis, acute (080) | 149 | 123 | 91 | 11th | [3] 32,504 | 41,099 | 24,967 | 285 | 247 | 170 |
| Rocky Mountain spotted fever (104). | ------ | 3 | 1 | (1) | (1) | (1) | (1) | ------- | 4 | 1 |
| Scarlet fever (050) | 1,835 | 1,425 | 2,336 | 32d | [4] 18,981 | 19,096 | 27,018 | [4] 3,290 | 2,657 | 4,416 |
| Smallpox (084) | 2 | 1 | 4 | 35th | 11 | 9 | 29 | 3 | 2 | 8 |
| Tularemia (059) | 18 | 27 | 32 | (1) | (1) | (1) | (1) | 28 | 51 | 64 |
| Typhoid and paratyphoid fever (040, 041).[5] | 73 | 42 | 41 | 11th | 3,016 | 3,441 | 3,480 | 101 | 68 | 71 |
| Whooping cough (056) | 1,743 | 2,159 | 2,159 | 39th | 24,918 | 25,355 | 28,434 | 3,316 | 3,819 | 3,819 |

[1] Not computed. [2] Additions: Nebraska, week ended Jan. 6, 3 cases; Indiana, week ended Dec. 23, 1950, 12 cases. [3] Deduction: North Carolina, week ended Dec. 16, 1950, 1 case. [4] Including cases reported as streptococcal sore throat. [5] Including cases reported as salmonellosis.

## Reported Cases of Selected Communicable Diseases: United States, Week Ended Jan. 13, 1951

[Numbers under diseases are International List numbers, 1948 revision]

| Area | Diphtheria (055) | Encephalitis, infectious (082) | Influenza (480–483) | Measles (085) | Meningitis, meningococcal (057.0) | Pneumonia (490–493) | Poliomyelitis (080) |
|---|---|---|---|---|---|---|---|
| **United States** | 96 | 7 | 1,788 | 7,190 | 107 | 1,558 | 149 |
| **New England** | 5 | - | 1 | 233 | 3 | 50 | 1 |
| Maine | - | - | - | 3 | 1 | 3 | - |
| New Hampshire | - | - | - | - | 1 | 1 | - |
| Vermont | - | - | - | 83 | - | - | 1 |
| Massachusetts | 5 | - | - | 134 | - | - | - |
| Rhode Island | - | - | 1 | 12 | - | - | - |
| Connecticut | - | - | - | 1 | 1 | 46 | - |
| **Middle Atlantic** | 5 | 3 | 15 | 1,221 | 9 | 189 | 28 |
| New York | 3 | 2 | [1] 5 | 335 | 3 | 65 | 16 |
| New Jersey | 1 | 1 | 10 | 328 | 1 | 84 | 5 |
| Pennsylvania | 1 | - | - | 558 | 5 | 40 | 7 |
| **East North Central** | 6 | - | 16 | 1,813 | 22 | 122 | 4 |
| Ohio | 5 | - | 13 | 625 | 10 | - | - |
| Indiana | - | - | - | 34 | 3 | 19 | 1 |
| Illinois | 1 | - | 3 | 317 | 3 | 65 | - |
| Michigan | - | - | - | 226 | 5 | 38 | 3 |
| Wisconsin | - | - | - | 611 | 1 | - | - |
| **West North Central** | 5 | 1 | 22 | 619 | 9 | 126 | 11 |
| Minnesota | 2 | - | - | 87 | 2 | 7 | 3 |
| Iowa | 1 | - | - | 8 | 1 | 9 | 3 |
| Missouri | 2 | - | 2 | 187 | 3 | 4 | 1 |
| North Dakota | - | - | 20 | 11 | 1 | 97 | - |
| South Dakota | - | 1 | - | 16 | - | - | 1 |
| Nebraska | - | - | - | - | 1 | - | 2 |
| Kansas | - | - | - | 310 | 1 | 9 | 1 |
| **South Atlantic** | 15 | - | 868 | 461 | 26 | 192 | 24 |
| Delaware | - | - | - | 7 | - | - | - |
| Maryland | 1 | - | 9 | 12 | 3 | 33 | 4 |
| District of Columbia | - | - | 1 | 19 | 1 | 18 | - |
| Virginia | 4 | - | 588 | 96 | 7 | 104 | 1 |
| West Virginia | 2 | - | 239 | 7 | 1 | 16 | 4 |
| North Carolina | 2 | - | - | 60 | 7 | - | 3 |
| South Carolina | 3 | - | 15 | 4 | 3 | 10 | 1 |
| Georgia | 1 | - | 16 | 244 | - | 11 | 5 |
| Florida | 2 | - | - | 12 | 4 | - | 6 |
| **East South Central** | 18 | 1 | 85 | 193 | 11 | 79 | 12 |
| Kentucky | 6 | - | 5 | 46 | 1 | 33 | 2 |
| Tennessee | 2 | 1 | 67 | 61 | 4 | - | 4 |
| Alabama | 7 | - | - | 7 | 3 | - | 1 |
| Mississippi | 3 | - | 13 | 79 | 3 | 46 | 5 |
| **West South Central** | 32 | - | 470 | 966 | 13 | 668 | 26 |
| Arkansas | 10 | - | 301 | 127 | 1 | 94 | 2 |
| Louisiana | 4 | - | 4 | 11 | 3 | 26 | 5 |
| Oklahoma | 4 | - | 165 | 81 | 2 | 32 | 4 |
| Texas | 14 | - | - | 747 | 7 | 516 | 15 |
| **Mountain** | 4 | - | 297 | 612 | 3 | 74 | 7 |
| Montana | - | - | 12 | 14 | - | 3 | - |
| Idaho | - | - | - | 29 | - | - | 1 |
| Wyoming | 1 | - | - | 16 | - | - | - |
| Colorado | 2 | - | 66 | 468 | 1 | 31 | 4 |
| New Mexico | - | - | 3 | 26 | - | 22 | 1 |
| Arizona | - | - | 216 | 42 | 1 | 18 | - |
| Utah | 1 | - | - | 14 | - | - | 1 |
| Nevada | - | - | - | 3 | 1 | - | - |
| **Pacific** | 6 | 2 | 14 | 1,072 | 11 | 58 | 36 |
| Washington | 1 | - | - | 568 | 2 | 2 | 8 |
| Oregon | 2 | - | 14 | 38 | - | 20 | 2 |
| California | 3 | 2 | - | 466 | 9 | 36 | 26 |
| Alaska | - | 1 | 5 | - | - | 1 | 2 |
| Hawaii | - | - | 8 | - | - | - | - |

[1] New York City only.

## Reported Cases of Selected Communicable Diseases: United States, Week Ended Jan. 13, 1951—Continued

[Numbers under diseases are International List numbers, 1948 revision]

| Area | Rocky Mountain spotted fever (104) | Scarlet fever (050) | Smallpox (084) | Tularemia (059) | Typhoid and paratyphoid fever [1] (040, 041) | Whooping cough (056) | Rabies in animals |
|---|---|---|---|---|---|---|---|
| **United States** | | 1,835 | 2 | 18 | 73 | 1,743 | 127 |
| **New England** | | 196 | | | 3 | 314 | |
| Maine | | 12 | | | 1 | 42 | |
| New Hampshire | | 5 | | | | 15 | |
| Vermont | | 10 | | | | 57 | |
| Massachusetts | | 134 | | | 1 | 120 | |
| Rhode Island | | 10 | | | | 42 | |
| Connecticut | | 25 | | | 1 | 38 | |
| **Middle Atlantic** | | 263 | | | 5 | 340 | 16 |
| New York | | [2] 137 | | | 3 | 126 | 16 |
| New Jersey | | 52 | | | 1 | 148 | |
| Pennsylvania | | 74 | | | 1 | 66 | |
| **East North Central** | | 489 | | 6 | 6 | 237 | 15 |
| Ohio | | 149 | | 1 | 1 | 58 | 8 |
| Indiana | | 45 | | | 3 | 22 | 7 |
| Illinois | | 84 | | 5 | 2 | 16 | |
| Michigan | | 183 | | | | 80 | |
| Wisconsin | | 28 | | | | 61 | |
| **West North Central** | | 108 | | | 5 | 71 | 17 |
| Minnesota | | 16 | | | 1 | 22 | 3 |
| Iowa | | 14 | | | 2 | 4 | 14 |
| Missouri | | 16 | | | 2 | 2 | |
| North Dakota | | 5 | | | | 8 | |
| South Dakota | | 2 | | | | 2 | |
| Nebraska | | 5 | | | | 6 | |
| Kansas | | 50 | | | | 27 | |
| **South Atlantic** | | 164 | | 10 | 6 | 239 | 13 |
| Delaware | | 2 | | | | 6 | |
| Maryland | | 12 | | | | 25 | |
| District of Columbia | | 8 | | | | 3 | |
| Virginia | | 32 | | 4 | 2 | 71 | |
| West Virginia | | 11 | | 1 | | 41 | |
| North Carolina | | 74 | | 3 | 1 | 58 | |
| South Carolina | | 2 | | | | 3 | 5 |
| Georgia | | 11 | | 2 | 2 | 22 | 7 |
| Florida | | [2] 12 | | | 1 | 10 | 1 |
| **East South Central** | | 140 | | 1 | 6 | 91 | 19 |
| Kentucky | | 51 | | 1 | 2 | 31 | 9 |
| Tennessee | | 67 | | | 3 | 21 | 6 |
| Alabama | | 15 | | | 1 | 37 | 1 |
| Mississippi | | 7 | | | | 2 | 3 |
| **West South Central** | | 117 | | 1 | 17 | 265 | 43 |
| Arkansas | | 1 | | 1 | | 44 | 3 |
| Louisiana | | 3 | | | 1 | 1 | 1 |
| Oklahoma | | 19 | | | | 9 | 2 |
| Texas | | 94 | | | 16 | 211 | 37 |
| **Mountain** | | 119 | 2 | | 2 | 104 | 3 |
| Montana | | 2 | | | | 7 | |
| Idaho | | 21 | | | | | |
| Wyoming | | | | | | 1 | |
| Colorado | | 14 | | | | 28 | 1 |
| New Mexico | | 5 | | | 1 | 30 | |
| Arizona | | 11 | 2 | | | 37 | 2 |
| Utah | | [2] 66 | | | 1 | 1 | |
| Nevada | | | | | | | |
| **Pacific** | | 239 | | | 23 | 82 | 1 |
| Washington | | 90 | | | 1 | 33 | |
| Oregon | | 28 | | | | 11 | |
| California | | [2] 121 | | | 22 | 38 | 1 |
| Alaska | | 1 | | | | 3 | |
| Hawaii | | 2 | | | | | |

[1] Including cases reported as salmonellosis.
[2] Including cases reported as streptococcal sore throat.



922528—51——3

# FOREIGN REPORTS

## CANADA

*Reported Cases of Certain Diseases—Week Ended Dec. 23, 1950*

| Disease | New-found-land | Prince Edward Island | Nova Scotia | New Bruns-wick | Que-bec | On-tario | Mani-toba | Sas-katch-ewan | Al-berta | Brit-ish Co-lum-bia | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Brucellosis |  |  |  |  |  | 1 |  |  |  |  | 1 |
| Chickenpox | 1 |  | 56 |  | 188 | 516 | 67 | 98 | 119 | 223 | 1,208 |
| Diphtheria |  |  |  |  | 3 |  |  |  | 1 |  | 4 |
| Dysentery, bacillary |  |  |  |  | 39 | 4 |  |  |  | 1 | 44 |
| German measles | 1 |  | 1 |  | 7 | 63 |  | 12 | 24 | 97 | 205 |
| Influenza |  |  | 18 |  |  |  | 1 |  |  | 3 | 22 |
| Measles | 13 |  | 2 |  | 255 | 1,369 | 32 | 4 | 7 | 38 | 1,720 |
| Meningitis, meningococcal |  |  |  |  | 1 | 1 |  |  | 1 |  | 3 |
| Mumps | 23 |  | 24 |  | 140 | 403 | 30 | 99 | 219 | 112 | 1,110 |
| Poliomyelitis |  |  |  | 1 |  | 1 |  |  |  |  | 2 |
| Scarlet fever |  |  |  | 1 | 67 | 37 | 13 | 11 | 68 | 35 | 232 |
| Tuberculosis (all forms) | 2 |  | 5 | 9 | 83 | 22 | 13 | 1 |  |  | 135 |
| Typhoid and paratyphoid fever |  |  |  |  | 7 | 2 |  |  |  |  | 9 |
| Venereal diseases: |  |  |  |  |  |  |  |  |  |  |  |
| Gonorrhea | 3 |  | 9 | 4 | 35 | 48 | 24 | 22 | 32 | 45 | 222 |
| Syphilis | 5 |  | 2 | 4 | 35 | 20 | 4 | 3 | 1 | 12 | 86 |
| Primary |  |  |  |  | 3 | 6 |  | 2 | 1 |  | 12 |
| Secondary |  |  |  | 1 | 2 | 4 |  | 1 |  |  | 8 |
| Other | 5 |  | 2 | 3 | 30 | 10 | 4 |  |  | 12 | 66 |
| Whooping cough | 5 |  | 7 | 1 | 52 | 102 | 14 |  | 5 | 18 | 204 |

## CUBA

*Reported Cases of Certain Diseases—4 Weeks Ended Oct. 28, 1950*

| Disease | Pinar del Rio | Habana: Habana City | Habana: Total | Ma-tanzas | Santa Clara | Cama-guey | Oriente | Total |
|---|---|---|---|---|---|---|---|---|
| Brucellosis |  | 1 | 2 |  |  |  |  | 2 |
| Cancer | 4 |  | 12 | 13 | 31 | 10 | 11 | 81 |
| Chickenpox |  | 1 | 1 |  |  |  | 1 | 2 |
| Diphtheria | 1 | 2 | 4 | 1 | 2 |  |  | 8 |
| Leprosy |  |  | 3 | 1 | 2 | 3 | 2 | 11 |
| Malaria |  | 2 | 3 |  |  | 3 | 5 | 11 |
| Measles |  |  |  |  |  |  | 3 | 3 |
| Poliomyelitis |  | 1 | 2 | 1 |  |  |  | 3 |
| Scarlet fever |  |  |  | 1 |  |  |  | 1 |
| Tetanus |  |  |  |  |  | 1 |  | 1 |
| Tuberculosis | 3 |  | 22 | 22 | 14 | 9 | 11 | 81 |
| Typhoid fever | 8 | 9 | 14 | 7 | 12 | 6 | 9 | 56 |

NOTE.—Report for provinces of Cuba for week ended Oct. 7, 1950, not received.

## JAMAICA

*Reported Cases of Certain Diseases—5 Weeks Ended Dec. 30, 1950*

| Disease | Kingston | Other localities | Total |
|---|---|---|---|
| Chickenpox | 3 | 6 | 9 |
| Diphtheria | | 2 | 2 |
| Dysentery, unspecified | 3 | 1 | 4 |
| Erysipelas | | 1 | 1 |
| Leprosy | 1 | 2 | 3 |
| Meningitis, meningococcal | 2 | | 2 |
| Poliomyelitis | | 2 | 2 |
| Tuberculosis, pulmonary | 34 | 56 | 90 |
| Typhoid fever | 4 | 66 | 70 |
| Typhus fever (murine) | 3 | | 3 |

## REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

**The following reports include only items of unusual incidence or special interest and the occurence of these diseases, except yellow fever, in localities which had not recently reported cases. All reports of yellow fever are published currently. A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.**

### Cholera

*India (French).* During the week ended December 23, 1950, 20 cases of cholera were reported in Karikal, and 8 cases were reported in Pondicherry.

### Plague

*Burma.* For the week ended December 23, 1950, seven cases (nine deaths) of plague were reported in Burma. During the previous week there were eight cases (five deaths).

*Madagascar.* During the period December 11–20, 1950, 29 cases (21 deaths) of plague were reported in Madagascar as compared with four cases (two deaths) for the period December 1–10.

### Smallpox

*Algeria.* During the period November 21–30, 1950, 24 cases of smallpox were reported in Algeria.

*Burma.* During the period December 10–16, 1950, 17 cases (3 deaths) of smallpox were reported in Burma.

*Dahomey.* For the period December 21–31, 1950, 48 cases of smallpox were reported in Dahomey.

*Great Britain.* Information from London states that a total of 32 cases (8 deaths) of smallpox have been reported in Brighton since November 28, 1950.

*India.* For the week ended January 6, 1951, smallpox was reported in ports of India as follows: Calcutta 423, Madras 54, and Bombay 19.

*Pakistan.* During the week ended January 6, 1951, three cases of smallpox were reported in Karachi.

*Togo (French).* During the period December 11–20, 1950, five cases of smallpox were reported in French Togo.

**Typhus Fever**

*India.* During the week ended January 6, 1951, six cases of typhus fever were reported in Bombay.

**Yellow Fever**

*Brazil.* During December 1950 approximately 20 deaths (number of cases unknown) from jungle yellow fever were reported in Uruacu, Goiaz State. The area is located in the interior of the State between the Tocantins and Araguaia Rivers. One death was histopathologically confirmed.

## SMALLPOX IN BRIGHTON, ENGLAND

The primary case was in a vaccinated person who developed the disease 2 days after arrival by air from Karachi on the west coast of India. A total of 15 confirmed cases has been reported, with 5 deaths. It is stated that 5 nurses in a hospital for infectious diseases, where earlier cases were admitted, have been infected.

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The printing of this publication has been approved by the Director of the Bureau of the Budget (August 10, 1949).

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It contains (1) current information regarding the incidence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

The Public Health Reports is published primarily for distribution, in accordance with the law, to health officers, members of boards or departments of health, and other persons directly or indirectly engaged in public health work. Articles of special interest are issued as reprints or as supplements, in which forms they are made available for more economical and general distribution.

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# Public Health Reports

VOLUME 66 FEBRUARY 9, 1951 NUMBER 6

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FEDERAL SECURITY AGENCY

PUBLIC HEALTH SERVICE

**FEDERAL SECURITY AGENCY**
***Oscar R. Ewing, Administrator***

**PUBLIC HEALTH SERVICE**
***Leonard A. Scheele, Surgeon General***

**Division of Public Health Methods**
***G. St. J. Perrott, Chief of Division***

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Public Health Reports

*Vol. 66* • FEBRUARY 9, 1951 • *No. 6*

# Cooperation Between Health and Welfare Agencies

## —A Health Officer's View—

By Leonard A. Scheele, M.D.*

The cultural lag between the enunciation of a new idea and public acceptance and action based upon it has been estimated as 30 years. In view of this, perhaps it is not surprising to find considerable discrepancy between what health and welfare workers say about cooperation and what they actually do about it. Thirty years ago, there were very few State welfare departments and only a bare patchwork of local programs for aid to mothers and old age pensions. Public health services were limited largely to purification of water supply systems and enforcement of communicable disease regulations.

Health and welfare programs have moved fast and far since that time, until today, from the ideological standpoint, it has become impossible to draw any sharp line between them. All social workers are aware, intellectually at least, that there is a health component in every social problem. All public health workers, worthy of the name, recognize a social component in the health problems that confront them.

At any gathering of health or welfare people, the need for a cooperative attack upon interrelated problems is likely to be discussed. Public health people talked about it extensively at the recent American Public Health Association meeting in St. Louis. There is an equal eagerness among social workers. Yet, after the meetings are over, a cold, analytical look at actual operations in local communities and throughout the Nation shows that the "trend" toward cooperation is painfully slow. From the standpoint of structure for cooperative action, these organizations seem to be almost as far apart as they were in the days when welfare meant an occasional coal or grocery order and when public health meant a red placard on the home of a scarlet fever patient.

Granting that social workers recognize the health implications of the problems they are dealing with and want to work with their

*Surgeon General, Public Health Service, Federal Security Agency. Delivered at the Annual Meeting of the American Public Welfare Association, Chicago, Ill., Dec. 2, 1950.

public health counterparts in attacking them, what agency do they approach? And where? And how? The answer varies, problem by problem, and State by State, for public health services are widely dispersed. Moreover, the dispersion has increased as public health services have expanded. This shows up clearly in the study of distribution of State health services which is conducted at 10-year intervals by the Public Health Service. The 1940 survey[1] revealed that as many as 18 different State agencies administered some type of health program within a single State. Our 1950 study is not yet complete, but a sampling of one State in each of our 10 geographic regions shows that in at least one State, 23 State agencies are administering health programs and that in no State are they administered by less than 9. Nor is there evidence of uniformity in philosophy and approach among these several agencies.

Next to the health department—and in many States even above the health department—the welfare department is the official agency which makes the greatest dollar investment in health services. Since the health and welfare agencies are the largest investors, they have the greatest responsibility to initiate and promote joint planning.

Out of such planning, not only a more soundly structured program but also an enrichment of services in both fields can be expected. The health professions are coming to realize more and more that their best skills and most effective treatments are of no avail in many cases, so long as the patient remains in the same adverse social and environmental situation which contributed to his illness. This is especially true in combating tuberculosis, venereal disease, and many chronic illnesses, and in the promotion of mental health. Health workers need to know people in the welfare field better so that there can be better utilization of their competencies for dealing with these social factors. All too often, we leave it to the patient to find his own solution to the social problems that are inherent in his health problem. And when he is both ill and uninformed about welfare resources, as is frequently the case, the social problems remain unmet and health efforts are wasted.

Conversely, the content of welfare programs can be enriched through better understanding and utilization of public health services. Preventive medicine has made great strides in recent years and can contribute much to the total well-being of the individual. Advances in the field of nutrition, for example, have not only given more knowledge about what the body needs at various age levels to maintain vigorous health but have also improved techniques for getting people to understand and apply this knowledge. Similarly, there have been improvements in techniques for case finding, early diagnosis, and

[1] Mountin, Joseph W. and Evelyn Flook: Distribution of Health Services in the Structure of State Government. Ed. 3. Public Health Bulletin No. 184.

treatment of many of the chronic diseases such as diabetes, cancer, and heart disease with the result that the disabling effects of such conditions can be greatly reduced and, in some cases, eliminated. How many incipient illnesses are there among the clients of welfare agencies, and how often do they receive medical attention before rather than after obvious symptoms appear? There are many people on welfare case loads who could benefit from the preventive and rehabilitation services which could be obtained through closer cooperation of public health and welfare personnel.

Fortunately, in Public Law 734—the 1950 Social Security Amendments—we have a catalyzing agent which both fields have long needed. Its medical care provisions are a challenge to those in the welfare field who are responsible for the well-being of their clients. These amendments are equally a challenge to those who are responsible for the maintenance of public health. Only by working together can the challenge be met successfully. This opportunity must be seized to eliminate the gaps and duplications, the inconsistencies and variations, in existing programs. Otherwise, today's confusions will be compounded in the future as we try to carry out the responsibilities which Public Law 734 has placed upon us.

Many would feel that the first steps must be taken Federally Already we in the Public Health Service and in the Social Security Administration have been giving much time to the devising of methods to bring together more closely all the Federal grant-in-aid programs that result in medical services to people. We recognize that if these congeries of services are brought together locally a much improved community health and welfare plan will result.

The closely coordinated approach of health and welfare personnel in Washington and in the Federal Security Agency regional offices is one means of fostering local coordination. Consequently, the specialized services which health agencies can be expected to give have been spelled out by the Public Health Service and presented to the Public Assistance Bureau. Plans are being made to set up a joint committee. Regional personnel of both Public Assistance and Public Health have been oriented. Those are the steps taken to date—there will be many more in the near future.

Equal desire for cooperation at the State level is evidenced by the fact that the Association of State and Territorial Health Officers, at their recent conference in Washington, passed a resolution strongly recommending health and welfare collaboration at both State and local levels.

The most effective medical care programs will be developed in communities that have adequate health departments, and welfare workers will help to promote the establishment of such departments in the many areas that now lack them. The last 15 years have seen

the development of a Nation-wide network of local welfare agencies and the resulting improvement in services. A Nation-wide network of health services is equally essential to progress in the health field.

In both State and local planning for the implementation of Public Law 734, there is urgent need for advisory committees, broadly representative of both the consumers and providers of health and medical services. Public health is already making effective use of such committees in many of its programs. This is done on the Federal level through nine advisory councils to the Public Health Service. The councils aid in the administration of the hospital survey and construction program as well as in aid to research and training and in control programs in such fields as mental health, cancer, and heart disease. The councils have been tremendously helpful in developing programs and policies that reflect the needs and interests of the Nation. Every State has an advisory body on the hospital program and many States have over-all planning groups for health services. In every instance where citizen groups have been given a real and effective voice in policy, the returns—in terms of public interest and support as well as in terms of sound programming—have been great. Welfare workers have made equally successful use of citizen advisory groups. It seems logical, therefore, to expect that by pooling community organization skills, this type of operation can be carried to an even higher level, gaining stronger community support and interest than either type of agency has hitherto obtained through independent efforts.

The urgency of immediate transition from talk to action must again be stressed. The need for streamlined operations which will deliver the utmost in health and welfare services to the individual at a minimum cost of money and manpower is growing day by day as more staff is drawn into the Armed Forces and as health and welfare take on the added functions of civil defense.

At the State and community levels, health and welfare agencies have already begun to demonstrate ability to get together promptly and effectively, in a truly cooperative way, for the development of civil defense plans. This response to the stimulus of an emergency situation will carry over into all endeavors.

Such an outcome is not only logical but also essential, for emergency services, to be effective, must be based upon and flow from soundly structured, well-administered normal services. We in public health and public welfare are striving toward common goals. As public servants, we have also a common responsibility to close ranks and move forward toward those goals, rendering services efficiently and effectively through cooperative planning and operations.

# Résumé of Public Health Service Grant-in-Aid Programs Providing Medical Services

By Estella Ford Warner, M.D., and Evelyn Flook*

With the introduction of legislation to broaden the Federal Social Security Act—providing, in addition to other changes, more medical care for the needy—the Social Security Administration established the Committee on Inter-Agency Relationships in Grant-in-Aid Programs Providing Medical Care. The committee was composed of representatives of the Bureau of Public Assistance—one of whom served as chairman—the Children's Bureau, Office of Vocational Rehabilitation, and Public Health Service. Purposes of the committee were: (*a*) consideration of the statutory bases and regulations, similarities, and differences in the various existing grant-in-aid programs; (*b*) review of services available and coverage of existing programs to identify the gaps and overlaps; (*c*) identification of points of contact in operation; (*d*) consideration of State problems and opportunities to take full advantage of the Federal provisions governing existing grant-in-aid programs; (*e*) exchange of information to fill the great gaps in knowledge of the various programs; and (*f*) consideration of the principles developed under each program to guide agencies in dealing with the States.

As background material for deliberations of the committee, this résumé of grant-in-aid programs administered by the Public Health Service has been prepared.

## BACKGROUND INFORMATION

### Description of Programs

*General Health Programs*

Grants-in-aid for general health purposes are designed to assist States, counties, health districts, and other political subdivisions of the States in establishing and maintaining adequate public health services. This includes: grants to State health departments to supplement State and local appropriations for basic State and local health services not provided for through categorical grants, such as public health nursing, laboratory services, communicable disease control, collection, analysis, and dissemination of vital statistics, health education, nutrition services, dental services, and environmental sanita-

*Chief, Division of State Grants, and Chief, Program Evaluation and Records Section, Division of State Grants, Bureau of State Services, Public Health Service.

tion; provision of technical assistance to State and local health departments through consultation and demonstrations; training of personnel for State and local health work.

*Categorical Health Programs*

*(Tuberculosis, venereal disease, cancer, heart disease, mental health, and dental health.)*

Categorical grants are made available for selected purposes in order to assure that they receive particular emphasis in the total State and local public health programs.

All categorical programs include assistance to States and local communities for case finding, diagnosis, and epidemiological follow-up; training of personnel for State and local health work in the designated category; education of the lay public; and research to improve methods of diagnosis and treatment.

In addition, the following services are also included for the programs indicated:

*Tuberculosis and venereal disease.* Provision of appropriate facilities for care and treatment (venereal disease—both in-patient and out-patient; tuberculosis—out-patient only).

*Cancer.* Federal funds may be used to purchase in-patient hospital care for diagnostic purposes for a period not to exceed 3 days. All other hospital care must receive prior approval. Expenditures for surgical or radiotherapeutic procedures requiring hospitalization are not permissible when unfavorable prognosis exists.

*Heart.* Establishment and operation of organized community programs of heart disease control and cooperation with public and private agencies in demonstration of improved techniques and procedures.

*Mental health.* Assistance in the development and maintenance of preventive, diagnostic, and out-patient clinical services (none of the services provided are for patients who are in hospitals) and coordination of all research and other activities conducted by both public and private agencies.

*Dental health.* Assistance to States and to local communities in planning, organizing, developing, and maintaining modern dental health services; demonstration of new and improved dental public health procedures for prevention and treatment of dental caries; and promotion of widespread use of latest professional techniques.

## State Agencies Administering Programs Utilizing Grant-in-Aid Funds From the Public Health Service

*General health, tuberculosis, and venereal disease.* All State health agencies utilize Federal grants for these three purposes.

*Cancer.* All States except New Hampshire utilize Federal cancer funds. In each instance, Federal funds are made available through the State health department. However, the Arkansas program is administered by the State Cancer Commission.

*Heart.* Plans for heart disease control programs of varying scope have been approved for all States but Wyoming. All programs are organized under the State health department.

*Mental health.* In 17 States, an agency other than the health department is the officially designated State mental health authority. All States utilize mental health funds.

*Dental health.* Forty-eight of the 53 State health departments conduct or financially support dental activities. General health, cancer, or Children's Bureau funds are used in these programs.

## Method of Administration

The State health agency—or, in the instance of mental health, the officially designated State mental health authority—may provide services by direct operation or may provide financial support of services operated by another agency or organization. Full responsibility for services may be placed with local health departments, aid being given by the State agency through funds, personnel, equipment, or contributed services.

## Extent of Programs

*Federal Appropriations Available for Grants to States, Fiscal Year 1950*

| | |
|---|---|
| General health | [1] $14, 200, 000 |
| Venereal disease: | |
| Regular | 7, 757, 000 |
| Projects (rapid treatment facilities; case finding) | 4, 500, 000 |
| Tuberculosis | 6, 790, 000 |
| Mental health | 3, 550, 000 |
| Heart disease | 2, 000, 000 |
| Cancer: | |
| Regular | 3, 500, 000 |
| Projects | 1, 000, 000 |
| Total Public Health Service grants | 43, 297, 000 |

(There is no categorical grant for dental services as such. However, dental services constitute one of the purposes for which general health, maternity and child health, or cancer funds may be used. It is estimated that about $150,000 of the $14,200,000 available for general health grants during fiscal year 1950 was expended for dental health. In 1949, the total from all sources expended for dental health was $1,839,133. This included $998,681 of Federal funds. In 1948, $1,473,259 was expended for dental health.)

[1] Approximately $1¼ million of this was budgeted for State sanitation activities which are not directly related to medical care.



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### *Direct Operations by Public Health Service, Fiscal Year 1950*

| | |
|---|---|
| Tuberculosis (X-ray surveys in large cities) | $1, 171, 396 |
| Venereal disease: | |
| Rapid treatment facilities | 1, 307, 211 |
| Case finding | 40, 000 |
| Mental health (demonstration project in a local health department) | 45, 000 |
| Dental health (studies and demonstrations) | 947, 371 |

### *State and Local Appropriations, Fiscal Year 1950*

*Reported by State health departments and 17 separate State Mental Health Authorities*

| | |
|---|---|
| Total (approximate) | $303, 000, 000 |
| State appropriations | [1] [2] 180, 000, 000 |
| Local appropriations | 123, 000, 000 |

[1] This does not include expenditures for mental hospitals, except ½ of 1 percent which may be used for matching Federal mental health grants.

[2] Approximately 6½ million dollars of State funds was budgeted for State sanitation activities which are not directly related to medical care.

### *Type and Scope of Services*

*a. Grant programs*

A wide variety of services significant to medical care programs are provided by State and local health departments. These may be grouped as immunizations, diagnostic laboratory services, clinical diagnostic services, diagnosis through X-ray, treatment clinics of various kinds, in-patient treatment of various kinds, medical and dental corrective services for school children, home and clinic nursing services, psychiatric and psychological services, administrative supervision of hospitals providing care for the several special programs, bedside nursing services, nutrition services, and medical social services. To a varying degree, State health departments, through the use of grant funds, either provide such services directly or financially support the services operated by local health departments.

Information on volume of service provided by State and local health departments is not available to the Public Health Service. However, some indication of the frequency with which State agencies directly provide or financially support designated types of services may be obtained from the pamphlet, Variations in State Public Health Programs (*1*), prepared annually by the Division of State Grants of the Service.

In the grant programs of the Public Health Service, reporting of activity by a State agency does not imply State-wide coverage. When a State agency reports participation in a particular type of service, only one county or one city in the State may be receiving such service; the entire State may be covered; or the service may fall between these two extremes. This situation is in sharp contrast to most of the welfare programs which must be State-wide in coverage.

A general idea of the extent to which selected types of services in-

volving some element of medical care are available in local health departments may be gained from Mountin's article, Changing Concepts of Basic Local Public Health Services (*2*). Since health departments may support services and facilities operated by some other agency, total community health resources are of interest also. For description of coverage see, Public Health Personnel, Facilities, and Services in Local Areas Having a Full-Time Health Officer (*3*).

*b. Direct service by the Public Health Service*

Services furnished directly by the Public Health Service to States or their political subdivisions are limited in scope. The more outstanding ones are:

*Tuberculosis.* Direct case-finding program (estimated number of persons X-rayed by small films during the fiscal year 1950—2,479,362).

*Venereal disease.* Direct case-finding program, including: development of new and improved case-finding techniques; development and dissemination of media for professional and public education; development and evaluation of time dose schedules of therapy utilizing penicillin and other antibiotics.

*Mental health.* Demonstration operation of a mental health clinic in a local health department, Prince George's County, Md. (During 1949, 486 persons were given consultation or treatment services. Of these, 281 were children and 187, adults.)

*Dental health.* Studies and demonstrations. Topical fluoride demonstration program initiated July 1, 1948—units operating in 40 States; 200,000 children had received treatment by January 1, 1950. Defluoridation of a communal water supply (Britton, S. D., and Bartlett, Tex.). Fluoridation of a communal water supply (Grand Rapids, Mich.). Determining the effectiveness of topical agents (Wilmington, Del.). Dental needs of children (Richmond, Ind. and Woonsocket, R. I.).

*How Services Are Provided*

*a. By salaried personnel*

(1) Medical (or dental) administration of the program.
(2) Laboratory services.
(3) Home and clinic nursing services.
(4) Mass radiography services.
(5) Case finding.
(6) Medical social services.
(7) Services of psychologists.
(8) Nutrition services.
(9) Corrective dentistry, prophylaxis, oral examinations.
(10) Maintenance and operation of hospitals for venereal disease, tuberculosis, cancer, etc.

*b. By purchase (including contract)*

(1) Services of professional personnel for providing corrective measures on an individual basis (rates vary from locality to locality).
(2) Services of medical clinicians including psychiatrists (usually paid on a clinic session basis—rates vary).
(3) Hospitalization—contract with a general hospital or a fixed remuneration per diem for each occupied bed (particularly for venereal disease and cancer patients).
(4) Services of readers of small X-ray films (average rate $10 per roll).
(5) Purchase of care in nursing homes (particularly for heart disease).
(6) Services of consultants.
(7) Pathological service.
(8) Corrective dentistry, prophylaxis, oral examinations.

## PROGRAM RELATIONSHIPS WITH OTHER AGENCIES

A close working relationship is maintained between the Public Health Service and the Children's Bureau in all grant-in-aid operations, since both Federal agencies are dealing with the same State agencies and with many of the same persons.

Continuous mutual consultation and exchange of information are carried on by the Public Health Service and the Office of Education in planning school health programs. The Children's Bureau also is represented on a committee charged with developing a program of school health.

A close working relationship is maintained between the Public Health Service and several offices of the Federal Security Agency: the Office of Federal State Relations, particularly the Divisions of State Grant-in-Aid Audits and State Merit System Services; the Office of Field Services; and the Office of General Counsel.

The Public Health Service and the Office of Vocational Rehabilitation are holding joint planning conferences in connection with development of chronic disease services.

The Public Health Service, the Department of Agriculture, and the Children's Bureau are engaged in cooperative work with respect to problems of nutrition; the Public Health Service and Department of Agriculture, with respect to matters of veterinary medicine.

A close working relationship is maintained between the Public Health Service and the Office of Indian Affairs with respect to the provision of all types of health services to the Indian population.

(Committee work will result in further program relationships).

## LEGISLATIVE BASE

### Legislative Requirements for State Plan

*For All Programs Except Cancer*

The basic Public Health Service law specifies that "the moneys so

paid to any State shall be expended solely in carrying out the purposes specified and in accordance with plans approved by the Surgeon General which have been presented by the health authority of such State." The basic law makes no provision as to the content of the State plan.

*For heart disease only.* Upon recommendation of the State health authority, payment may be made direct to political subdivisions of a State or to nonprofit organizations if the State health authority has not, prior to August 1 of any fiscal year, presented and had approved a plan.

*For Cancer*

The basic Public Health Service law does not require a State plan. Hence, State plans for cancer grant-in-aid programs are required by regulation only.

### Determination of Allotments

*For All Programs Except Heart Disease and Cancer*

The Surgeon General, with the approval of the Administrator, is empowered to determine annually from appropriations for the respective purposes the total sum which shall be available for allotment, and, in accordance with regulations, make allotments to the several States on the basis of:

The population.
The extent of the several problems (venereal disease, tuberculosis, mental health, etc.).
The financial need of the respective States.

*For Heart Disease*

The same legislative provisions as above apply except that only two factors can be considered in determining allotments:

The population.
The financial need.

*For Cancer*

There is no legislative basis for determining allotments. Basis is determined by regulation only.

### Matching Requirements

*For All Programs Except Cancer*

The basic law provides that the amount of State and local funds to be expended for each purpose shall be determined in accordance with regulation.

*For Cancer*

There is no legislative basis for determining matching requirements. Basis is determined by regulation only.

## ADMINISTRATIVE BASE

### Regulations

All regulations and amendments thereto regarding grants to States shall be made after consultation with State health authorities or, in the case of regulations or amendments which relate to or affect grants for mental health, the State mental health authority.

### Programs Supported by Grants Subject to Allotment

*Requirements for State Plans (All Programs)*

*Program purpose*

(1) Each State making application for grants shall submit, through its State health authority—or, in the case of mental health, the State mental health authority—plans for each fiscal year for carrying out the several purposes.

*For heart disease only.* Plans of cooperating agencies for heart disease control programs, in lieu of State plans, shall be submitted through the State health authority.

(2) A State making application for Federal funds for more than one of the purposes authorized may consolidate its plan: *Provided,* that the information specifically required for a State plan is distinguished with respect to each purpose.

(3) Plans shall be prepared in accordance with forms supplied by the Public Health Service and may be amended with the approval of the Surgeon General or his designee.

*Plan content*

A plan with respect to any program shall include:

(1) A description of the current organization for and health services included in the program and the proposals for extending, improving, and otherwise modifying such organization.

(2) Provision for health services in substantial accordance with nationally accepted standards.

(3) A budget by project totals for carrying out the services described.

(4) A statement that the plan, if approved, will be carried out as described and in accordance with applicable provisions of the Public Health Service Act and regulations prescribed thereunder.

*Time of submittal and approval*

(1) For a continuing program an annual plan shall be submitted at least 45 days prior to the beginning of the Federal fiscal year to which the plan relates.

(2) A plan or amendment thereto shall not be approved for any

period antedating receipt of such plan by the Public Health Service: *Provided*, that exceptions to this rule may be made by the Surgeon General when necessary to meet emergencies.

(3) The budget for health services shall not be approved unless each item thereof relates to activities described in the plan.

(4) For heart disease only—A plan for a heart disease control program submitted by a cooperating agency shall not be approved unless recommended by the State health authority.

*Basis of Allotment*

*For general health*

Of the amount available for allotment for general health purposes other than mental health:

From 90 to 95 percent on the basis of population weighted by financial need;

From 5 to 10 percent on the basis of the extent of special health problems.

*For venereal disease, tuberculosis, and mental health*

From 20 to 40 percent on the basis of population weighted by financial need;

From 60 to 80 percent on the basis of the extent of the problem (venereal disease, tuberculosis or mental health, as the case might be).

*For cancer*

Sixty percent on the basis of population weighted by financial need;
Thirty-five percent on the basis of the extent of the cancer problem;
Five percent on the basis of relative population density.

*For heart disease*

A portion on the basis of a uniform per capita allotment not to exceed 10 cents per capita for the first 100,000 population or part thereof of each State. The remaining amount on the basis of the remaining population of each State weighted by financial need.

*Matching Requirements*

The expenditure of at least one State or local dollar for each two Federal dollars is required for all programs.

## Programs Utilizing Project Grants

*Venereal disease*

Any State or, with the consent of the State health authority, any county, health district, or other political subdivision of a State, making application for project grants shall submit applications for grants setting forth a proposed plan for the operation of a project, including proposed budgets, and reports on official forms prescribed by the Surgeon General.

State health agencies, universities, hospitals, laboratories, institutions, or professional nonprofit organizations will be eligible to apply for funds for projects relating to cancer control. The applicant shall submit plans for such projects through the State health authority

### Required Reports

The Surgeon General may require the submission of information pertinent to the operation of the plans and to the purpose of the grants, including the following:

1. A certification from the State health authority on an official form as to the amount of State and local funds available for carrying out the State plan.

2. A statement from the State health authority showing on an official form the estimates of need by fund and functional activity for the second succeeding year.

3. Quarterly reports on official forms showing total receipts, expenditures, unliquidated encumbrances, and balances of Federal funds; and for the first three quarters, total quarterly expenditures from Federal grants and other sources for each activity shown in the budget for health services.

4. A report on an official form showing personnel, facilities, and services for each local health organization included in the current State plan.

5. The following reports on official forms shall be submitted by the State health authority with respect to tuberculosis control activities:

a. A semiannual report on mass chest surveys, and tuberculosis morbidity and mortality, with separate report for cities of 500,000 population or over

b. An annual report on clinic and nursing services.

6. The following reports on official forms shall be submitted by the State health authority with respect to venereal disease activities:

- a. A quarterly report on laboratory activities, drug distribution, and fees to private physicians.
- b. A quarterly activity report for each cooperative health unit or a summary of such activities by the State health authority.
- c. A quarterly morbidity report with separate report by each city of 200,000 population or over.

### Audit

1. Audit of the activities and programs described in the plan may be made after prior consultation with the State health authority or the cooperating agency.

2. Records, documents, and information available to the State

health authority or cooperating agency pertinent to the audit shall be accessible for purposes of audit.

## Conditions of Eligibility

*From the Federal standpoint*

There are no restrictions on eligibility for service by virtue of the grant funds involved, except that:

(1) Federal funds for cancer may be used to purchase in-patient hospital care for diagnostic purposes for a period not to exceed 3 days. All other hospital care for cancer must receive specific prior approval. Expenditures for surgical or radio-therapeutic procedures requiring hospitalization are not permissible when *unfavorable* prognosis exists.

(2) None of the tuberculosis, heart disease, or mental health services provided are for patients who are in hospitals.

*From the State and Local Standpoint*

Restrictions on eligibility for the several types of service vary. For instance:

*Venereal disease*

No limitations on provision of diagnostic services. Eligibility for treatment varies with the State or local community.

*Tuberculosis*

As a rule, anyone is eligible for mass radiography and diagnostic laboratory services, whereas, in some States, complete clinical diagnosis and pneumothorax refills may be available only to those who cannot afford the services of a private physician. There is greatest variability with respect to financial and residence requirements for admission to State and county tuberculosis hospitals.

*Cancer*

Some States limit detection center service to those referred by a private physician or to those in good health. Some centers are available to female applicants only or to those over 35 or 40 years of age. The States are more likely to limit diagnostic and/or treatment clinic service to those claiming medical indigency—some require certification of this fact—and to those with a "danger signal" referred by a physician. Pathological service in some States is provided only for clinic patients. In other States the service is available to all physicians and is free only for their indigent patients; other patients pay a set fee ranging from $3 to $6. In some States there is a volunteer pathological service for indigent cases. State-financed hospitalization of those with cancer is most often limited to the indigent. The majority of States require that the case be remediable, though a few

do not. Legal residency in the State is a specified requirement in several States.

*Dental health*

As a rule, topical fluoride applications and other services for school children are available to all. Other services may be limited to indigents only.

*Mental health*

Diagnostic and child guidance services are most commonly made available without limitations. Admission to State mental hospitals may be on either a free, part-pay, or full-pay basis. In the majority of States, fees are not collected from the patients.

### Limitations Because of Shortages of Funds or Personnel

*General Health*

*Personnel*

Personnel shortages exist in both State and local health departments. Many programs in State health departments are without full-time directors. Many other essential positions are vacant in State health departments.

Of the 1,291 full-time organizations providing local health service, 299 had vacancies in the health-officer position in June 1949. At the same time only 65 counties of 1,636 reporting to the Public Health Service and 8 of 237 independent cities reporting had sufficient personnel to meet the established minimum staffing standards in all four classes (physicians, nurses, sanitation personnel, and clerks). A breakdown of the number of counties and cities having sufficient personnel in each class to meet the minimum staffing standards follows:

| | *Counties* | *Cities* |
|---|---|---|
| Physicians | 769 | 80 |
| Nurses | 148 | 25 |
| Sanitation personnel | 956 | 192 |
| Clerks | 774 | 103 |

It is estimated that to meet minimum staffing requirements, the Nation would virtually have to double the number of personnel now employed in these four classes. Additional personnel are also needed in other categories, such as dentists, dental hygienists, nutritionists.

*Lack of local organizations*

In June 1949, between 35 and 40 million people were residing in areas without full-time health organizations.

Many States lack enabling legislation for the establishment of local health units.

*Funds*

The tremendous shortage of funds available for providing adequate public health services is reflected in the personnel situation and in the number of areas without full-time local health organizations, which form the basic structure for carrying out not only the general health services but the specialized programs represented by the categorical grants.

*Venereal Disease Case Finding*

*Acquired syphilis.* With reduction in the annual incidence there has arisen a need for the development of case-finding techniques which will make it economically feasible to reach that segment of the infected population which has not responded to present-day case-finding activities.

*Congenital syphilis.* The discovery of early congenital syphilis is handicapped by the difficulty of securing serological samples from infants and young children. The recent development of a reliable serological test using capillary blood applied on a filter paper from a needle prick rather than venous blood promises to facilitate the finding of congenital syphilis.

*Tuberculosis*

Many State and local tuberculosis programs are seriously handicapped because of their inability to obtain sufficient medical clinicians and public health nurses for follow-up. Less frequently, but even more seriously, perhaps, the position of full-time medical director of the program is vacant. Occasionally there are also shortages of X-ray technicians, health educators, medical social workers, and clerical personnel. Personnel shortages are largely attributed to salaries which are too low to attract qualified professional workers.

Diagnosis, treatment, and follow-up services are limited in almost every State because of shortages in funds and personnel. Because of insufficient funds, hospital beds, diagnostic and treatment clinics, and X-ray facilities are still acutely inadequate in most places. Because of insufficient nursing personnel, follow-up of cases discovered through surveys, and of their family contacts, has lagged far behind the case-finding program.

*Cancer*

Several States have very limited cancer control programs because of shortages of funds or trained personnel. They are able to provide little more than a partial educational program and perhaps a few other central office services. In 1948, only six States completely lacked clinic service. However, in very few of the remaining States is the clinic coverage adequate geographically. The lack of a full-time program director is one of the major handicaps in about half of

the States. Several States are hampered because they must rely on volunteer clerical, pathological, or clinical personnel. Elsewhere, State funds are eaten up providing hospitalization. In few States would program expansion be possible with present funds and personnel.

*Heart Disease*

Most State programs are not handicapped because of lack of funds at this time. However, trained personnel in this comparatively new public health program are difficult to obtain and many State programs are seriously handicapped due to lack of personnel.

*Dental Health*

Dental health programs in most States are handicapped by lack of funds and especially by shortages of dentists and dental hygienists. In 1948, 19 States had no full-time public health dentist serving local areas with full-time health organization.

*Mental Health*

Both State and local activities are seriously handicapped because of the severe Nation-wide shortage of mental health workers, particularly psychiatrists, clinical psychologists, psychiatric nurses, and social workers. A sizable proportion of grants is therefore being used for training such personnel. As in other health fields, low salary scales have hampered recruitment of personnel for expanding and improving mental hygiene activities in many States. The most serious limitation to some programs is the amount of funds available.

## PENDING OR PROPOSED LEGISLATION

### General Health

*Status*

Three local public health services bills—H. R. 274, H. R. 913, and S. 445—were introduced in the Eighty-second Congress, on January 3, 4, and 11, 1951, respectively. The House bills were referred to the Committee on Interstate and Foreign Commerce and the Senate bill to the Committee on Labor and Public Welfare. Reports from both committees are pending.

*Purpose*

To assist the States, through grants, in developing and maintaining local public health units organized to provide essential full-time public health services in all areas of the Nation, particularly in national defense areas, and in the training of all types of personnel for local public health unit work.

*Implementation*

Essentially the bills do not create a new program. They would

merely implement principles of extending local public health services provided in the Public Health Service Act. This is to be effected by amendments to and substitutions for sections 314 and 315 of the current act.

*Major Provisions of Senate Bill*

Regulations which the Surgeon General shall prescribe with respect to local public health units:

a. The minimum population to be served by each unit in different areas.
b. The minimum number and types of personnel which units in different areas must employ.
c. Methods of administration including the merit basis of personnel administration.
d. The types of service for which Federal funds provided under this section may be expended under State plans, which may include:
   (1) Diagnosis and prevention of disease.
   (2) Control of communicable disease
   (3) Health education.
   (4) Demonstrations.
   (5) Sanitation.
   (6) Vital statistics.
   (7) The training of personnel for State and local public health work.
   (8) Other aspects of preventive medicine.
e. Federal funds provided under this section may not be expended for medical, dental, or nursing care except in:
   (1) The diagnosis or prevention of disease.
   (2) The control of communicable disease.

*Major Provisions of House Bills*

a. *State plans must provide for:*
   (1) Local public health unit coverage as soon as practicable of all defense areas, and extension of local health units to other areas at the maximum rate consistent with the availability of personnel and facilities.
   (2) Evidence of authority of the State health agency and all local public health units covered to carry out the plan.
   (3) Inclusion of sufficient population and financial resources in each local public health unit to assure continuing financial support for efficient and economic administration.
   (4) Employment of full-time personnel of such types and in such numbers as are required to render minimum basic public health services to the population served by each local public health unit.
   (5) Allocation of all funds to local health units by methods which will assure their equitable distribution and effective use in extension and expansion of basic public health services.
   (6) Methods of administration which include establishment and maintenance of personnel standards on a merit basis.
   (7) Submission of reports required by the Surgeon General.

b. *Types of services for which Federal funds may be expended*

Federal funds provided under this pending legislation may be expended for:

(1) Health education and information.
(2) Laboratory services.
(3) Vital statistics.
(4) Communicable disease control.
(5) Environmental sanitation.
(6) Maternal and child health.
(7) Demonstrations related to public health.
(8) Training of personnel for local public health work.
(9) Other aspects of preventive medicine.

c. *Types of services for which Federal funds may not be expended*

Federal funds provided under this pending legislation may not be expended for:

(1) Industrial accident prevention programs.
(2) Medical or dental treatment, except in:
  (a) Communicable disease control.
  (b) Epidemic or other emergency situations.
  (c) Activities for which Federal aid is authorized under other provisions of the law.

*Limit of Federal Aid*

Federal funds would be provided to meet approximately one-third of the State expenditures for the Nation as a whole, within a limit of $1.50 per capita. A sliding-scale matching ratio is provided, with low-income States receiving a relatively higher Federal share, but never to exceed 66⅔ percent.

REFERENCES

(1) Campbell, Josephine, Mullins, Rubye F., and Kennedy, Marion: Variations in State Public Health Programs as Portrayed by the Annual Combined Report and Plan for Fiscal Year 1948. Federal Security Agency, Public Health Service, January 1949.
(2) Mountin, Joseph W.: Changing concepts of basic local public health services. Am. J. Pub. Health 39: 1417-1428 (1949).
(3) Flook, Evelyn, Gill, Arthur P., and Dubber, Bessie Patrick: Public Health Personnel, Facilities, and Services in Local Areas Having a Full-time Health Officer, as Reported for the Year 1947. Federal Security Agency, Public Health Service, June 1949.

# Incidence of Disease

*No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring*

## UNITED STATES

### Reports From States for Week Ending January 20, 1951

Except for Gordo, Ala., there were no reports of the occurrence of influenza in epidemic form in the United States. The outbreak in Alabama should be regarded as an "influenza-like disease" until presence of influenza virus can be confirmed by laboratory tests.

#### Reports of Epidemics

*Typhoid fever.* Dr. G. W. Cox, Texas State Health Officer, has reported 17 cases of typhoid fever within recent weeks from a single county. These cases were principally in children who had attended a banquet. The vehicle of infection is thought to have been food. Only four cases of the disease had been reported in this county over a period of 6 years prior to the present epidemic.

*Streptococcal sore throat.* Dr. R. M. Albrecht, New York State Department of Health, has reported an outbreak of streptococcal infection in one ward of one building in an institution for mentally defective children. There were 15 cases with a rash (1 on January 12, 1951; 6 on January 13; 4 on January 14; and 4 on January 15). Many other children had fever and sore throat. Spread of infection was not considered to be by food but by contact. The mother of the first case visited the child on January 7. Apparently another case of scarlet fever had occurred in the family.

*Influenza in Europe.* From reports of the World Health Organization and of other sources, the incidence of influenza has been highest in northern England. Incidence in Scotland has been relatively low, but A-prime virus has been isolated in Edinburgh. Of the influenza deaths reported, 85 percent are in persons over the age of 55.

Influenza has been present in the Netherlands and Belgium and has reached Iceland. The disease is progressing through France from the north and south. A clinically mild type of influenza is prevalent in Spain.

#### Influenza Information Center [1]

The strain study center in the laboratory of Dr. T. P. McGill, State University Medical Center, Brooklyn, N. Y., has received the influenza virus from throat washings from three cases in London.

[1] National Institutes of Health, Bethesda, Md.

This is reported to be A-prime. This laboratory has also received the A-prime isolated in Sweden earlier in the season and A-prime virus isolated in Leyden, Holland. These strains all appear to be similar in antigenic characteristics.

Dr. J. E. Salk, University of Pittsburgh, reports the recovery of influenza virus isolated from a patient who was ill on December 27, 1950. Antigens in influenza vaccine, especially the A-prime component, match the Pittsburgh strain. At the present time there is no indication of an outbreak of influenza in Pittsburgh.

The Division of Preventive Medicine, Office of the Surgeon General, Department of the Army, reports serologic diagnosis of type B influenza virus from a case in military personnel in Dayton, Ohio. The onset of illness was approximately January 5.

The Department of Virus and Rickettsial Diseases of the Army Medical Service Graduate School has examined the Swe 3–50 influenza virus isolated in Sweden during June 1950 and the London 1–51 strain from the current English outbreak. Tests with human sera showed that both viruses belong to the general A type. Tests with strain-specific rooster antisera indicate that the Swedish and London viruses are similar though not identical to the 1950 Cuppett virus. Neither virus showed a significant reaction with PR8 (type A) nor FM1 (type A-prime) antiserum.

*Comparative Data For Cases of Specified Reportable Diseases: United States*

[Numbers after diseases are International List numbers 1948 revision]

| Disease | Total for week ended— | | 5-year median 1946–50 | Seasonal low week | Cumulative total since seasonal low week | | 5-year median 1945–46 through 1949–50 | Cumulative total for calendar year — | | 5-year median 1946–50 |
|---|---|---|---|---|---|---|---|---|---|---|
| | Jan. 20, 1951 | Jan. 21, 1950 | | | 1950–51 | 1949–50 | | 1951 | 1950 | |
| Anthrax (062) | 3 | ------ | --- | (1) | (1) | (1) | (1) | 4 | 1 | 2 |
| Diphtheria (055) | 85 | 119 | 252 | 27th | 3, 200 | 4, 791 | 7, 087 | 302 | 520 | 729 |
| Encephalitis, acute infectious (082) | 11 | 13 | 8 | (1) | (1) | (1) | (1) | 25 | 35 | 22 |
| Influenza (480–483) | 2. 097 | 4. 563 | 4, 585 | 30th | 20, 276 | 43, 495 | 49, 077 | 5, 731 | 12, 965 | 12, 965 |
| Measles (085) | 9, 020 | 4, 329 | 5, 490 | 35th | 50, 278 | 31, 449 | 39, 697 | 21, 577 | 12, 319 | 13, 573 |
| Meningitis, meningococcal (057.0) | 116 | 106 | 100 | 37th | 1, 280 | 1, 186 | 1, 186 | 319 | 273 | 266 |
| Pneumonia (490–493) | 1. 511 | 2. 274 | ------- | (1) | (1) | (1) | (1) | 4. 744 | 6, 746 | ------- |
| Poliomyelitis, acute (080) | 164 | 116 | 69 | 11th | 32, 668 | 41, 834 | 25, 036 | 419 | 303 | 239 |
| Rocky Mountain spotted fever (104) | ------ | ------- | ------- | (1) | (1) | (1) | (1) | ------ | 4 | 2 |
| Scarlet fever (050) | 2, 307 | 1, 649 | 2, 428 | 32d | 21, 288 | 20. 745 | 29, 754 | 5, 597 | 4, 306 | 6, 844 |
| Smallpox (084) | ------ | 2 | 2 | 35th | 11 | 12 | 30 | 3 | 4 | 9 |
| Tularemia (059) | 18 | 32 | 32 | (1) | (1) | (1) | (1) | 46 | 83 | 87 |
| Typhoid and paratyphoid fever (040, 041) [2] | 35 | 46 | 46 | 11th | 3, 051 | 3, 487 | 3, 520 | 136 | 114 | 117 |
| Whooping cough (056) | 1, 890 | 2, 192 | 2, 192 | 39th | 26, 808 | 27, 547 | 30, 919 | 5. 206 | 6. 011 | 6. 011 |

[1] Not computed.
[2] Including cases reported as salmonellosis.

## Reported Cases of Selected Communicable Diseases: United States, Week Ended January 20, 1951

[Numbers under diseases are International List numbers, 1948 revision]

| Area | Diphtheria (055) | Encephalitis, infectious (082) | Influenza (480 483) | Measles (085) | Meningitis, meningococcal (057.0) | Pneumonia (490-493) | Poliomyelitis (080) |
|---|---|---|---|---|---|---|---|
| **United States** | 85 | 11 | 2,097 | 9,020 | 116 | 1,511 | 164 |
| **New England** | 3 | 2 | 6 | 251 | 5 | 77 | 5 |
| Maine | | | 1 | 6 | | 14 | |
| New Hampshire | | | 2 | | 1 | 1 | |
| Vermont | | | | 80 | | | |
| Massachusetts | 3 | 2 | | 140 | 2 | | 4 |
| Rhode Island | | | | 7 | 1 | 4 | |
| Connecticut | | | 3 | 9 | 1 | 58 | 1 |
| **Middle Atlantic** | 8 | 2 | 6 | 1,842 | 24 | 158 | 25 |
| New York | 5 | | [1] 4 | 538 | 6 | 41 | 18 |
| New Jersey | | 1 | 2 | 301 | 5 | 61 | 3 |
| Pennsylvania | 3 | 1 | | 1,003 | 13 | 56 | 4 |
| **East North Central** | 4 | 2 | 39 | 1,795 | 18 | 160 | 13 |
| Ohio | 1 | | 11 | 363 | 11 | | 2 |
| Indiana | 1 | | 27 | 68 | | 16 | 2 |
| Illinois | 2 | | | 362 | 6 | 82 | 3 |
| Michigan | | 2 | 1 | 284 | | 62 | 5 |
| Wisconsin | | | | 718 | 1 | | 1 |
| **West North Central** | 5 | 1 | 20 | 668 | 10 | 25 | 5 |
| Minnesota | 1 | | 1 | 58 | 3 | 4 | |
| Iowa | 1 | | | 5 | | 2 | |
| Missouri | 2 | | 7 | 282 | 5 | 2 | 2 |
| North Dakota | | | 11 | 16 | 1 | 5 | |
| South Dakota | | 1 | | 15 | | | 1 |
| Nebraska | | | | | | | 2 |
| Kansas | 1 | | 1 | 292 | 1 | 12 | |
| **South Atlantic** | 26 | | 733 | 487 | 18 | 228 | 24 |
| Delaware | | | | 10 | | | |
| Maryland | 2 | | 1 | 12 | 1 | 38 | 1 |
| District of Columbia | | | | 33 | 2 | 30 | |
| Virginia | 4 | | 454 | 132 | 4 | 98 | 2 |
| West Virginia | | | 171 | 15 | 5 | 24 | |
| North Carolina | 8 | | | 91 | 2 | | 2 |
| South Carolina | 9 | | 67 | 5 | 1 | 18 | 3 |
| Georgia | 2 | | 40 | 171 | 3 | 20 | 8 |
| Florida | 1 | | | 18 | | | 8 |
| **East South Central** | 7 | | 306 | 533 | 14 | 45 | 6 |
| Kentucky | 3 | | 1 | 382 | 1 | | |
| Tennessee | 2 | | 43 | 74 | 5 | | 2 |
| Alabama | 2 | | 250 | 6 | 4 | | 3 |
| Mississippi | | | 12 | 71 | 4 | 45 | 1 |
| **West South Central** | 21 | 2 | 682 | 1,762 | 16 | 686 | 22 |
| Arkansas | 3 | | 515 | 231 | | 66 | 1 |
| Louisiana | 6 | 1 | 3 | 172 | 1 | 40 | 5 |
| Oklahoma | 3 | | 164 | 109 | 2 | 36 | 5 |
| Texas | 9 | 1 | | 1,250 | 13 | 544 | 11 |
| **Mountain** | 2 | | 285 | 586 | 1 | 73 | 9 |
| Montana | 1 | | 54 | 11 | | | 1 |
| Idaho | | | | 34 | | | |
| Wyoming | | | | 23 | | | |
| Colorado | | | 27 | 334 | | 18 | 6 |
| New Mexico | 1 | | 2 | 28 | | 7 | |
| Arizona | | | 202 | 101 | | 48 | 2 |
| Utah | | | | 55 | 1 | | |
| Nevada | | | | | | | |
| **Pacific** | 9 | 2 | 20 | 1,096 | 10 | 59 | 55 |
| Washington | 4 | | 4 | 512 | 2 | 8 | 9 |
| Oregon | | | 6 | 34 | 1 | 23 | 5 |
| California | 5 | 2 | 10 | 550 | 7 | 28 | 41 |
| Alaska | | | 1 | | | 1 | |
| Hawaii | | | | | | 2 | 1 |

[1] New York City only. *Anthrax:* New Jersey, 2 cases; Pennsylvania, 1 case. *Psittacosis:* Illinois, 1 case.

## Reported Cases of Selected Communicable Diseases: United States, Week Ended January 20, 1951—Continued

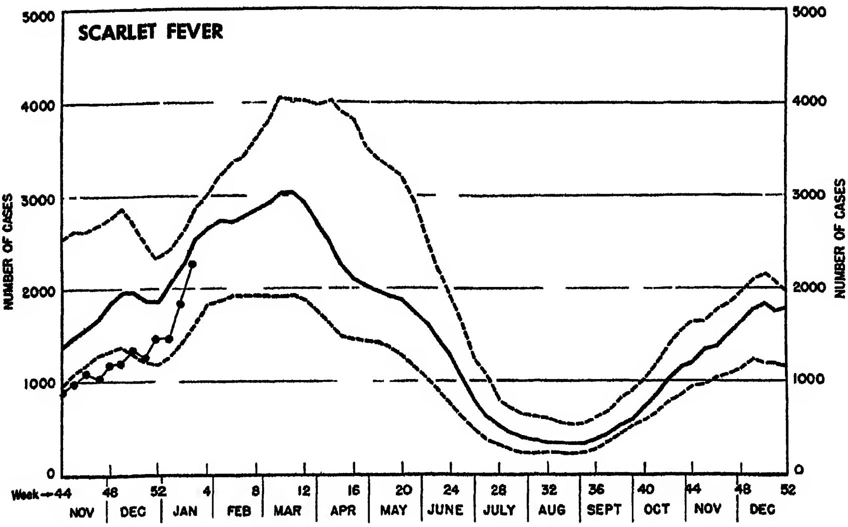
[Numbers under diseases are International List numbers, 1948 revision]

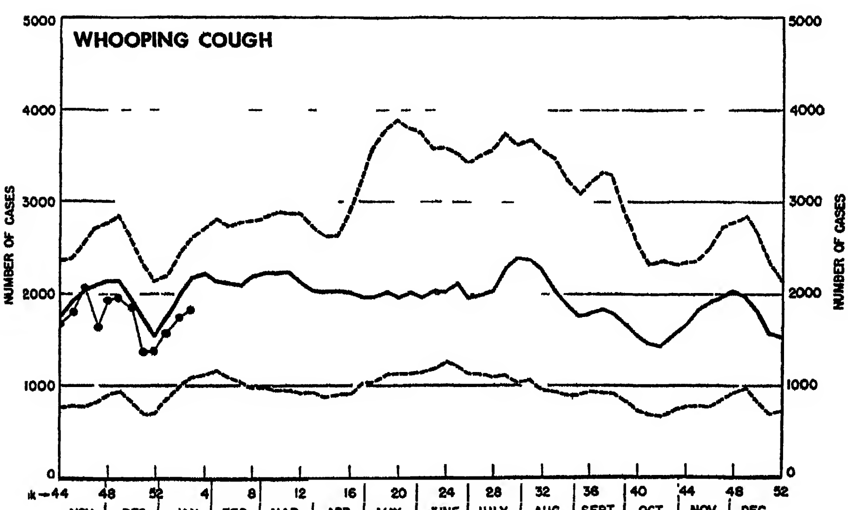
| Area | Rocky Mountain spotted fever (104) | Scarlet fever (050) | Smallpox (084) | Tularemia (059) | Typhoid and paratyphoid fever [1] (040, 041) | Whooping cough (056) | Rabies in animals |
|---|---|---|---|---|---|---|---|
| **United States** | | 2,307 | | 18 | 35 | 1,890 | 127 |
| **New England** | | 199 | | | 1 | 250 | |
| Maine | | 9 | | | | 70 | |
| New Hampshire | | 7 | | | | | |
| Vermont | | 3 | | | | 60 | |
| Massachusetts | | 157 | | | 1 | 61 | |
| Rhode Island | | 2 | | | | 35 | |
| Connecticut | | 21 | | | | 21 | |
| **Middle Atlantic** | | 456 | | | 8 | 409 | 17 |
| New York | | [2] 253 | | | 3 | 134 | 16 |
| New Jersey | | 40 | | | 2 | 128 | |
| Pennsylvania | | 163 | | | 3 | 147 | 1 |
| **East North Central** | | 510 | | 2 | 1 | 310 | 15 |
| Ohio | | 146 | | | 1 | 37 | 4 |
| Indiana | | 45 | | 1 | | 23 | |
| Illinois | | 86 | | | | 25 | |
| Michigan | | 193 | | | | 153 | 9 |
| Wisconsin | | 40 | | 1 | | 72 | 2 |
| **West North Central** | | 130 | | 3 | 5 | 78 | 15 |
| Minnesota | | 29 | | | | 30 | 3 |
| Iowa | | 5 | | 1 | 1 | 3 | 12 |
| Missouri | | 43 | | 1 | 2 | 11 | |
| North Dakota | | 3 | | | | 5 | |
| South Dakota | | 4 | | | 1 | 2 | |
| Nebraska | | 5 | | | 1 | | |
| Kansas | | 41 | | 1 | | 27 | |
| **South Atlantic** | | 215 | | 6 | 3 | 227 | 19 |
| Delaware | | 5 | | | | 8 | |
| Maryland | | 32 | | | | 25 | |
| District of Columbia | | 14 | | | | 11 | |
| Virginia | | 46 | | 3 | 1 | 44 | 1 |
| West Virginia | | 17 | | | | 52 | |
| North Carolina | | 67 | | | 1 | 62 | |
| South Carolina | | 1 | | | | 5 | 9 |
| Georgia | | 20 | | 3 | 1 | 15 | 6 |
| Florida | | [2] 13 | | | | 5 | 3 |
| **East South Central** | | 128 | | 4 | 3 | 67 | 23 |
| Kentucky | | 41 | | | | 7 | 12 |
| Tennessee | | 67 | | 1 | 2 | 24 | 2 |
| Alabama | | 10 | | | | 33 | 7 |
| Mississippi | | 10 | | 3 | 1 | 3 | 2 |
| **West South Central** | | 138 | | 2 | 3 | 293 | 36 |
| Arkansas | | 6 | | 1 | | 15 | 5 |
| Louisiana | | 10 | | | | 1 | |
| Oklahoma | | 30 | | 1 | | 21 | 1 |
| Texas | | 92 | | | 3 | 256 | 30 |
| **Mountain** | | 197 | | 1 | 3 | 182 | |
| Montana | | 5 | | 1 | | 79 | |
| Idaho | | 39 | | | | 8 | |
| Wyoming | | | | | | 6 | |
| Colorado | | 23 | | | | 18 | |
| New Mexico | | 3 | | | 3 | 27 | |
| Arizona | | 21 | | | | 39 | |
| Utah | | [2] 106 | | | | 5 | |
| Nevada | | | | | | | |
| **Pacific** | | 334 | | | 8 | 74 | 2 |
| Washington | | 117 | | | | 25 | |
| Oregon | | 25 | | | | 2 | |
| California | | [2] 192 | | | 8 | 47 | 2 |
| Alaska | | | | | | 6 | |
| Hawaii | | 3 | | | | 1 | |

[1] Including cases reported as salmonellosis. [2] Including cases reported as streptococcal sore throat.

# Communicable Disease Charts

*All reporting States, November 1950 through January 20, 1951*




The upper and lower broken lines represent the highest and lowest figures recorded for the corresponding weeks in the 5 preceding years. The solid line is a median figure for the 5 preceding years. All three lines have been smoothed by a 3-week moving average. The dots represent numbers of cases reported weekly, 1950–51.

# FOREIGN REPORTS

## CANADA

*Reported Cases of Certain Diseases—Week Ended December 30, 1950*

| Disease | Newfoundland | Prince Edward Island | Nova Scotia | New Brunswick | Quebec | Ontario | Manitoba | Saskatchewan | Alberta | British Columbia | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Brucellosis |  |  |  |  |  |  | 3 |  |  | 1 | 4 |
| Chickenpox |  |  | 12 | 2 | 77 | 538 | 52 | 63 | 69 | 59 | 872 |
| Diphtheria |  |  |  |  | 2 |  |  |  |  |  | 2 |
| Dysentery, bacillary |  |  |  |  |  | 6 |  |  |  | 6 | 12 |
| Encephalitis, infectious |  |  |  |  |  |  |  | 1 |  |  | 1 |
| German measles | 1 |  | 8 | 1 | 5 | 55 |  | 12 | 9 | 7 | 98 |
| Influenza |  |  | 15 |  |  | 2 |  |  |  |  | 17 |
| Measles | 16 |  | 12 |  | 73 | 1,055 | 87 | 51 | 12 | 10 | 1,316 |
| Meningitis, meningococcal |  |  | 2 |  |  | 4 |  |  |  |  | 6 |
| Mumps | 7 |  | 18 |  | 53 | 388 | 20 | 78 | 154 | 54 | 772 |
| Poliomyelitis |  |  |  |  |  |  |  | 1 |  |  | 1 |
| Scarlet fever |  |  |  |  | 39 | 63 | 7 | 4 | 57 | 37 | 207 |
| Tuberculosis (all forms) |  |  |  | 12 | 51 | 27 | 29 | 5 | 2 | 86 | 212 |
| Typhoid and paratyphoid fever |  |  |  |  | 2 |  |  | 1 |  |  | 3 |
| Venereal diseases: |  |  |  |  |  |  |  |  |  |  |  |
| Gonorrhea | 5 |  | 9 | 8 | 47 | 41 | 20 | 12 | 35 | 51 | 228 |
| Syphilis | 2 |  | 2 | 4 | 13 | 17 | 2 | 4 |  | 3 | 47 |
| Primary |  |  |  |  | 3 | 3 |  | 2 |  |  | 8 |
| Secondary |  |  |  |  |  | 2 |  |  |  |  | 2 |
| Other | 2 |  | 2 | 4 | 10 | 12 | 2 | 2 |  | 3 | 37 |
| Whooping cough | 2 |  | 5 | 4 | 12 | 93 | 21 |  | 2 | 11 | 150 |

## CUBA

*Reported Cases of Certain Diseases—4 Weeks Ended November 25, 1950*

| Disease | Pinar del Rio | Habana |  | Matanzas | Santa Clara | Camaguey | Oriente | Total |
|---|---|---|---|---|---|---|---|---|
|  |  | Habana City | Total |  |  |  |  |  |
| Brucellosis |  |  |  |  | 1 |  |  | 1 |
| Cancer | 2 |  | 37 | 14 | 24 | 8 | 12 | 97 |
| Chickenpox |  |  |  |  |  | 1 | 3 | 4 |
| Diphtheria |  | 3 | 8 | 5 |  | 1 | 5 | 19 |
| Hookworm |  |  | 13 |  |  |  |  | 13 |
| Leprosy | 1 |  | 4 |  | 1 | 3 |  | 9 |
| Malaria | 5 | 1 | 4 | 1 | 4 | 4 | 124 | 142 |
| Measles |  | 1 | 1 |  |  |  | 1 | 2 |
| Poliomyelitis |  | 1 | 2 |  |  |  | 1 | 3 |
| Tuberculosis | 2 |  | 19 | 11 | 11 | 19 | 7 | 69 |
| Typhoid fever | 7 | 7 | 22 | 4 | 13 | 6 | 28 | 80 |
| Whooping cough |  |  | 4 |  |  |  |  | 4 |

## FINLAND

*Reported Cases of Certain Diseases—November 1950*

| Disease | Cases | Disease | Cases |
|---|---|---|---|
| Diphtheria | 90 | Scarlet fever | 3,548 |
| Dysentery | 3 | Typhoid fever | 4 |
| Meningitis, meningococcal | 10 | Venereal diseases: | |
| Paratyphoid fever | 65 | Gonorrhea | 554 |
| Poliomyelitis | 33 | Syphilis | 38 |

## REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

**The following reports include only items of unusual incidence or of special interest and the occurrence of these diseases, except yellow fever, in localities which had not recently reported cases. All reports of yellow fever are published currently. A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.**

### Cholera

*Burma.* During the week ended January 13, 1951, 29 cases of cholera were reported in Bassein, compared with 8 for the previous week. For the week ended January 13, three cases were reported in Akyab.

*India.* For the week ended January 13, 1951, 41 cases of cholera were reported in Calcutta, compared with 52 for the previous week. During the week ended January 6, 41 cases were reported in Nagpur.

### Smallpox

*Dahomey.* During the period January 1–10, 1951, 45 cases of smallpox were reported in Dahomey.

*Egypt.* For the week ended December 16, 1950, three cases of smallpox were reported in Suez.

*India.* For the week ended January 13, 1951, 294 cases of smallpox were reported in Calcutta and 33 cases were reported in Bombay. For the week ended January 6, 423 and 19 cases were reported in Calcutta and Bombay, respectively.

*Iran.* During the week ended January 13, 1951, eight cases of smallpox were reported in Iran, of which one was in Teheran.

*Pakistan.* Four cases of smallpox were reported in Karachi for the week ended January 13, 1950.

### Yellow Fever

*Colombia.* Two fatal cases of jungle yellow fever were reported in Puerto Lopez, Territory of Meta for the period December 17–25, 1950.

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The printing of this publication has been approved by the Director of the Bureau of the Budget (August 10, 1949).

The PUBLIC HEALTH REPORTS, first published in 1878 under authority of an act of Congress of April 29 of that year, is issued weekly by the Public Health Service through the Division of Public Health Methods, pursuant to the following authority of law: United States Code, title 42, sections 241, 245, 247; title 44, section 220.

It contains (1) current information regarding the incidence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

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# Public Health Reports

VOLUME 66 **FEBRUARY 16, 1951** NUMBER 7

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PUBLIC HEALTH SERVICE

FEDERAL SECURITY AGENCY

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**Division of Public Health Methods**

*G. St. J. Perrott, Chief of Division*

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# Public Health Reports

*Vol. 66* • FEBRUARY 16, 1951 • *No. 7*

## Accuracy of Supplemental Medical Information on Birth Certificates

By A. M. Lilienfeld, M.D., M.P.H., E. Parkhurst, M.Sc., R. Patton, M.A., and E. R. Schlesinger, M.D., M.P.H.*

The past several years have witnessed an increased interest in the routine collection of morbidity statistics. The value of this procedure depends upon the accuracy of the reported data and extent of under-reporting. Although several types of morbidity reporting systems are in use, knowledge of the accuracy of information obtained is limited (*1*). The addition of a supplemental medical report on the birth certificate has provided a new type of morbidity reporting. This report is designed to obtain data on diseases and injuries occurring during pregnancy and parturition. The increasing use of this type of reporting makes it essential that its accuracy be studied.

As a result of inquiries into the causes of loss of life of mothers and infants in the 1930's, the need for basic medical information was stressed (*2*). Since this information could be continuously and currently obtained only from birth certificates, a supplemental medical report form on the face of the birth certificate was included as optional for the States on the model birth certificate prepared in 1939 by the Division of Vital Statistics of the U. S. Bureau of the Census. The form was adopted in New York State [1] in January 1940, but was placed on the reverse side of the certificate. The form now in use (fig. 1) requests information on complications of pregnancy and labor,[2] operative or instrumental procedures,[3] method of induction of labor, Rh factor, birth injuries, and congenital malformations.[4]

*From the Bureau of Maternal and Child Health and the Office of Vital Statistics, New York State Department of Health, Albany, N. Y.

[1] When New York State is mentioned in this study, it is understood that the area covered is New York State exclusive of New York City.

[2] Whether or not a complication is thought to be present depends upon the judgment of the physician or person completing the report. In obstetrics, however, the clinical entities are fairly well categorized. The types and groups of complications reported may be noted from table 3.

[3] The term, operative procedures, does not include episiotomies.

[4] Prior to January 1, 1949, the question on Rh factor was not included, but birth weight and the indications for operative procedure were requested. Beginning on January 1, 1949, the question on birth weight was transferred to the face of the certificate, that on the indications for operative procedures was omitted, and Rh factor added.

During the decade that this form has been used, information in the supplemental report has been given on about 90 percent of the birth certificates. Some of the statistical aspects of tabulating these data have been reported on the basis of the first 18 months' experience with this report form (*3*). From indirect evidence, it was thought that the complications were understated in varying degree, but no attempt was made to determine the actual degree of under-reporting.

The widespread adoption of this supplemental report and the desire to use this type of information in studies of reproductive wastage made it desirable to ascertain the accuracy of the information thus obtained. This presentation reports the results of such a study.

## Method of Study

Since in New York State 97.5 percent of the births recorded in 1949 occurred in hospitals, the best method of determining the accuracy of reporting is a comparison of the hospital record with the birth certificate. Hospital records, although not always complete, provide a convenient method for this type of investigation. Therefore, any under-reporting found by such a comparison will be less than the true differences between the actual event and the report on the certificate.

A study of a random sample of all birth certificates was ruled out since it was impractical to visit all the hospitals that would be selected through such a procedure. Consideration was also given to the variations that were believed to exist among types of hospitals. It was first thought that hospitals connected with medical schools would have a higher degree of reporting than others. To take into account this possible variation, a sampling procedure stratified by type of hospital was selected at the start of the study. However, after the first six hospitals were investigated, the results did not warrant study of additional hospitals.

The total number of hospitals and births recorded in 1949 in New York State and the births in the six hospitals sampled are presented in table 1 according to size of hospital.

**Table 1.** *Distribution of hospitals and live births in Upstate New York and in the sample, by size of hospital, 1949*

| Size of hospital by number of births | Number of hospitals | Total births | Hospitals in sample | Total births in sample hospitals | Total births in sample |
|---|---|---|---|---|---|
| Over 1000 | 38 | 68,489 | 4 | 7,631 | 673 |
| 500–1000 | 61 | 42,524 | 1 | 825 | 208 |
| Less than 500 | 158 | 30,911 | 1 | 437 | 219 |
| Total | 257 | 141,924 | 6 | 8,893 | 1,100 |
| Home births | | 3,691 | | | |
| Total live births | | 145,615 | | | |

The four sampled hospitals that had over 1,000 births in 1949 were connected with medical schools. Of the remaining two hospitals, one was a voluntary institution and the other proprietary. These six hospitals were well distributed over New York State.

For each hospital, a systematic random sample was obtained of approximately 200 births registered with the Office of Vital Statistics of the New York State Department of Health in 1949. A list of names of births was sent to the medical record librarian of the hospital. A team consisting of the consultant obstetrician of the Bureau of Maternal and Child Health and a biostatistician of the Office of Vital Statistics visited each hospital and compared the hospital record with the statements on the reverse of the birth certificate.

Hospital records were found for all cases selected except 21 which were not available at the time of inspection. In hospital A, however, only 92 of the 189 selected certificates had the supplemental report filled out. In this hospital, only half of the practicing physicians complete the supplemental report routinely. Only the completed certificates were included in the tabulations in this report since this study is based on a comparison of hospital records with the group of birth certificates (90 percent) that had been filled out.

## Results

In all, 1,100 birth certificates with supplemental medical reports completed were compared with hospital records (table 2). The hospital records disclosed that complications of pregnancy or labor were present in 291 births. Information about these complications was found on only 113 or 39 percent of the birth certificates. The question on complications of pregnancy or labor was answered in the negative on the birth certificates in 178 cases in which such information appeared on the hospital record. It should be emphasized that the

Table 2. *The percentage of complications of pregnancy and parturition, operative procedures and birth injuries and malformations reported in each hospital sample*

| Hospitals sampled | Births recorded in 1949 | Number records examined | Complications of pregnancy and parturition | | | Operative procedures | | | Birth injuries and malformations | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | On hosp. records | On birth certifs. | Percent reported | On hosp. records | On birth certifs. | Percent reported | On hosp. records | On birth certifs. | Percent reported |
| Total | 8,893 | 1,100 | 201 | 113 | 39 | 548 | 513 | 94 | 41 | 13 | 34 |
| Hospital A | 2,405 | 92 | 18 | 6 | 33 | 11 | 7 | 64 | 1 | 0 | 0 |
| Hospital B | 1,536 | 194 | 51 | 29 | 57 | 30 | 33 | 84 | 9 | 2 | 22 |
| Hospital C | 1,321 | 194 | 57 | 15 | 26 | 129 | 130 | 101 | 11 | 2 | 18 |
| Hospital D | 2,369 | 193 | 46 | 8 | 17 | 144 | 140 | 97 | 3 | 0 | 0 |
| Hospital E | 825 | 208 | 64 | 18 | 28 | 137 | 117 | 85 | 8 | 4 | 50 |
| Hospital F | 437 | 219 | 55 | 37 | 67 | 88 | 86 | 98 | 9 | 5 | 56 |

space was not left blank on the certificate; it was stated that no complication had occurred.

The 113 births with complications stated on the certificate were all reported correctly, that is, the particular complication mentioned on the birth certificate was also on the hospital record. In this sample, at least, it may be concluded that all the complications reported on the birth certificate were actually present, but that less than half of the actual complications mentioned in the hospital records were reported on the birth certificate.

The percentage of complications reported in each of the six hospitals varied from 17 percent in hospital D to 67 percent in hospital F. This variation was thought to be related to the differences in practice among these hospitals with regard to the person completing the birth certificate. In hospitals A, B, C, and E, the certificate was completed by the supervising nurse. In hospital D, the resident physician or interne had this responsibility and in hospital F, the practicing physician. One of the reasons for the marked degree of underreporting may be that hospital personnel, either physician or nurse, complete the certificate in five of these hospitals. Even though the complete hospital record is available, these individuals are naturally not as cognizant of complications that had occurred during the prenatal period. They are, no doubt, more aware of complications at or near the time of labor. This is borne out by table 3 which presents the degree of reporting by either individual complications or groups of complications.

The percentage of types of complications reported varies from 9

Table 3. *The distribution of complications of pregnancy and parturition reported in hospital sample, and in New York State (exclusive of New York City) during 1949*

| | Total live births 1949 | Hospital sample of 1,100 | | |
|---|---|---|---|---|
| | | On hospital record | On birth certificate | Percent reported |
| Total | 145, 615 | | | |
| Question on complication not answered | 14, 577 | | | |
| Total with question answered | 131, 038 | | | |
| No complications of pregnancy or labor | 111, 552 | 809 | 987 | |
| With complications of pregnancy or labor | 19, 486 | 291 | 113 | |
| Total complications | 21, 192 | 309 | 111 | 37 |
| Deviations of the bony pelvis | 1, 352 | 10 | 5 | 50 |
| Breech presentation | 3, 200 | 41 | 26 | 63 |
| Other dystocia | 8, 275 | 100 | 42 | 42 |
| Cord anomalies | 388 | 5 | 2 | 40 |
| Previous pelvic trauma | 1, 111 | 7 | 7 | 100 |
| Postpartum hemorrhage | 382 | 10 | 2 | 20 |
| Toxemias | 2, 122 | 36 | 9 | 25 |
| Placental anomalies | 1, 631 | 16 | 12 | 75 |
| Bleeding during pregnancy or labor | 594 | 38 | 4 | 11 |
| Other puerperal complications [1] | 514 | 2 | 1 | 50 |
| Nonpuerperal complications [2] | 1, 623 | 44 | 4 | 9 |

[1] Other puerperal complications include pyelitis, other genito-urinary diseases, and hydramnios.
[2] Nonpuerperal complications include heart disease, tuberculosis, syphilis, endocrine diseases, anemia and blood diseases, appendicitis, respiratory diseases, other intercurrent diseases.

to 100 percent. The lowest percentage is for nonpuerperal complications which include tuberculosis, syphilis, heart disease, diabetes, etc. These complications are usually diagnosed during the prenatal period, and hospital personnel may not know about them since they have, in most instances, been already controlled by the physician by the time the patient is admitted for delivery. On the other hand, 75 percent of placental anomalies and 63 percent of breech deliveries are reported. These are primarily complications that are diagnosed at or near the time of delivery. The complete reporting (100 percent) of previous pelvic trauma was the result of the mention of a previous Cesarean section on both the hospital record and certificate as an indication for another Cesarean. The low percentage of reports of postpartum hemorrhage is expected since the birth certificate is usually completed soon after the birth before the occurrence of the hemorrhage.

Table 3 also includes the distribution of complications of pregnancy and parturition that occurred among all live births recorded in New York State in 1949. The distribution of complications in the hospital sample does not differ significantly from this distribution.

It is desirable to know the conditions under which the degree of under-reporting would be minimal. This point was investigated in the cases of neonatal deaths and Caesarean sections. In the sample of 1,100 births, 19 infants died within the first month of life. In 12 of these, the mother had a complication recorded on the hospital chart, 11 of which were reported on the certificate. This study is concerned solely with birth certificates of live births and does not include stillbirths. As in the case of neonatal deaths, the degree of under-reporting of complications associated with stillbirths is probably also low. This is to be expected since the individual completing the certificate is more conscious of the possible causes of stillbirths or neonatal deaths.

In this sample there were 34 Caesarean sections. Complications were mentioned in 33 of these on the hospital record, and 25, or 76 percent, of these complications were reported on the birth certificate. This relatively higher degree of reporting is probably related to the dramatic operative procedure involved.

The reporting of operative or instrumental procedures was found to be at a much higher level; 94 percent of all procedures recorded on hospital charts were reported on the certificate (table 2). However, there were five errors in reporting. Two of these consisted of reporting low forceps procedures on the certificate when none was stated on the hospital record. The other three consisted of interchanges of low and mid forceps procedures. In general, reporting of the operative and instrumental procedures appears to be satisfactory.

The reporting of birth injuries and congenital malformations in the

sample is approximately on the same level as the reporting of complications (table 2). The numbers are too small to permit drawing any conclusions other than that considerable under-reporting exists. This may be due to the fact that many malformations and birth injuries are diagnosed after the certificate is completed.

## Discussion

A distressing degree of under-reporting of complications of pregnancy and labor on the birth certificate is disclosed by the present study. Originally, the medical report was added in order to provide a means for studying the factors involved in the causation of maternal and neonatal mortality, prematurity, etc. Such information could be continuously and currently obtained only through birth and stillbirth certificates. The use of this information in program planning has been indicated by earlier workers (*4*, *5*). The need for collection of such data is as important today as when the present system was inaugurated. Recent studies have indicated a method by which this information might be utilized administratively in the evaluation of programs for the care of the premature infant (*6*) and as an aid in early case finding of cerebral palsy (*7*). Thus, the collection of accurate data is important both from the viewpoint of epidemiological research and from the administrative viewpoint of program planning, case finding, etc., in the field of maternal and child health. The mere fact that about 40 States have placed the supplementary medical items on their birth certificates in one form or another, indicates the prevailing view that such information is of value.

The basic problem which must be faced is that of finding methods by which the accuracy of reporting can be increased. Since this

*Supplemental Medical Report—Not To Be Copied Into Local Register*

**All facts entered below will be considered confidential and will not appear in the certifications or transcripts issued by the Department**

| | | | |
|---|---|---|---|
| State any complications of pregnancy and labor | | | |
| State any operative or instrumental procedures used | | | |
| Was labor induced?<br>Yes ☐ No ☐ | If yes, state whether<br>Mechanically ☐ Other means ☐ | Was mother's blood tested for Rh factor?<br>Yes ☐ No ☐ | If yes, was blood<br>Rh+☐ Rh−☐ |
| Describe any birth injury | | | |
| Describe any congenital malformation | | | |

**Figure 1. Supplemental medical report on reverse of live birth certificate in use during 1949 in New York State.**

system was inaugurated, no consistent attempt has been made to show physicians the value of accurate and complete reporting of this type of data. A start has been made to promote better reporting in New York State through the support of the Medical Society of the State of New York (*8*). The other means by which the accuracy of reporting may be increased is indicated in some of the findings of the present study, namely, that in four of the six hospitals the report is completed by the supervising nurse. There might be further improvement if the physician who has had the case under his supervision during the prenatal period would complete the forms.

***Confidential Medical Report—Not To Be Copied Into Local Register***

| Complications of Pregnancy and Labor. (*Check at least one item in each column.*) | | | |
|---|---|---|---|
| Related to Pregnancy | Not Related to Pregnancy | Labor | Operative Procedures |
| □ None<br>□ Pre-eclampsia<br>□ Eclampsia<br>□ Hypertensive disease<br>□ Nephritis<br>□ Pernicious vomiting<br>□ Pyelitis<br>□ Anemia<br>□ Other—specify | □ None<br>□ Heart disease<br>□ Diabetes<br>□ Syphilis<br>□ Tuberculosis<br>□ Other—specify | □ None<br>□ Placenta previa<br>□ Premature separation of placenta<br>□ Prolapse of cord<br>□ Anomaly of cord<br>□ Breech presentation<br>□ Other malpresentations<br>□ Contracted pelvis<br>□ Other dystocia<br>□ Postpartum hemorrhage<br>□ Other—specify | □ None<br>□ Low forceps<br>□ Mid forceps<br>□ High forceps<br>□ Cesarean section<br>□ Breech extraction<br>□ Internal version & extraction<br>□ Other—specify |
| Was mother's blood tested for Rh factor?<br>No □ Yes, Rh+ □ Yes, Rh− □ | | | |
| Birth injury to infant: No □ Yes □ If yes, describe | | | |
| Congenital malformation of infant: No □ Yes □ If yes— describe | | | |

**Figure 2. Revised supplemental medical report in experimental use in several hospitals in New York State.**

The present form (fig. 1) also leaves some doubt in the mind of the person completing it as to the information sought. The greater degree of reporting of operative procedures may be due to the fact that an operative procedure is a specific entity while a complication of pregnancy is more or less a matter of judgment. To overcome this difficulty, a new form has been devised (fig. 2) in which specific complications and operative procedures are listed and the physician need only check the appropriate item, thereby greatly facilitating the completion of the certificate. The revised form has been endorsed for experimental use by the Medical Society of the State of New York and is being tried in several hospitals. A report concerning the efficiency of this form will be presented when sufficient data have been obtained.

## Summary and Conclusions

A sample of births that occurred in six hospitals in New York State was studied in an attempt to determine the degree of accuracy of reporting complications of pregnancy and parturition, operative procedures, and birth injuries and malformations. The hospital records of 1,100 births were compared with the information reported on the birth certificate.

It was found that 39 percent of the complications of pregnancy and parturition, 94 percent of operative procedures, and 34 percent of birth injuries and malformations recorded on the hospital charts were also reported on the birth certificates. All the complications mentioned on the certificate were reported correctly. In the event of a neonatal death or a Caesarean section, the degree of reporting was markedly increased; 92 percent of the complications in neonatal deaths and 75 percent of the complications associated with Caesarean sections were reported. In addition, when types of complications were considered, those occurring during labor and delivery were more adequately reported than those occurring during the prenatal period. This was correlated with the fact that in four of the six hospitals the certificates were completed by hospital personnel.

The necessity for obtaining complete and accurate maternal morbidity data was emphasized. Methods of improving accuracy of reporting were discussed with emphasis on a revised supplemental report form to facilitate completion of the report.

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# Q Fever Studies in Southern California

## XII. Aureomycin Treatment of Dairy Cattle Naturally Infected With *Coxiella burnetii*

By Lauri Luoto, D.V.M., M.P.H.,* Robert J. Huebner, M.D.,* and Herbert G. Stoenner, D.V.M.†

Cattle have been repeatedly implicated by epidemiological studies as sources of Q fever infection for man (*1, 2, 3, 4, 5*). *Coxiella burnetii*, the causative agent, has been found in the milk of more than 10 percent of dairy cows studied in the Los Angeles area (*6*). Intensive epidemiological studies in the area have shown that dairy cattle and their products, such as raw milk, are an important source of human infection (*4, 5*).

Epizoologic studies showed that, of 60,000 dairy cattle shipped into the area annually, between 40 to 50 percent acquire asymptomatic infection within 6 months after being brought onto infected premises (*7*). These animals shed *C. burnetii* continuously or intermittently in the milk for periods of time exceeding one lactation period (*8*). The organisms were isolated on autopsy from the mammary gland and adjacent lymph nodes of an infected cow (*9*). Recently, dairy cows have been shown to be sources of gross contamination to the environment by the postparturient passage of highly infected placental membranes (*10*).

Ultimate control of human Q fever may be dependent on the control or eradication of the infectious agent in livestock. This control might be accomplished through therapy of infected animals or by prophylactic methods. Aureomycin, an antibiotic, has been found effective in modifying *C. burnetii* infections in experimental animals and man (*11, 12*). We are reporting on a pilot study of the effect of aureomycin treatment of dairy cows naturally infected with *C. burnetii*.

### Material and Methods

The effectiveness of aureomycin [1] in overcoming bovine infection with *C. burnetii* was determined by the presence of the organisms in

*From National Institutes of Health, Microbiological Institute, Public Health Service, Bethesda, Md.
†Communicable Disease Center, Atlanta, Ga., assigned to Rocky Mountain Laboratory, Hamilton, Mont.
[1] Aureomycin-Lederle. The workers are indebted to Dr. Herald Cox, Chief of the Virus and Rickettsial Laboratory, Lederle Laboratories, Division of American Cyanamid Co., Pearl River, N. Y., for supplying the drug used in this study.

the milk of dairy cows before and following treatment, and by the presence of specific complement-fixing antibodies in the blood serum of such cows. Two methods of treatment, intramammary infusion and intravenous injection, were studied in separate experiments on infected dairy cows of two commercial dairy herds.

### *Methods of Determining Infection*

The infection status of the cows was determined a month before, during, and after treatment by means of the complement-fixation test of the blood serums (*13*). Mature lactating cows having antibody titers of 3+ at 1:32 or greater were selected, since 90 to 95 percent of such animals have been found to be shedding organisms in their milk (*7*). Cows were selected with factors of age, breed, and lactation equalized between 10 test and 10 control cows in each of the two herds studied. The influence of udder indurations and clinical evidence of mastitis upon the effectiveness of the drug was considered.

The infection status of the selected cows was further determined by the presence of *C. burnetii* in their milk as demonstrated by the guinea-pig test. Specimens from each of the four quarters of the udders of all cows were collected prior to, during, and at intervals after treatment. These were frozen at −10° C. and kept until injected subcutaneously in amounts of 1 cc. and intraperitoneally in amounts of 3 cc. in two 500–800 gm. guinea pigs. Uninoculated control guinea pigs were distributed among the test guinea pigs to determine the prevalence of spontaneous infection among the test animals. Guinea pigs were bled from the heart 30 days later, and the serums were tested for complement-fixing antibodies against *C. burnetii* (*13*). A titer of 3+ at 1:32 or greater in serums of one or both guinea pigs was regarded as evidence of infection and of the presence of *C. burnetii* in the milk specimen being tested.

Tests were performed on the milk specimens from each udder quarter of all cows before starting treatment. Milk specimens from cows treated by udder infusion were tested 4 and 11 days following completion of treatment. Specimens of cows treated intravenously were tested 3 days, 14 days, and 6 months following treatment. Corresponding milk specimens from control cows were not all tested in guinea pigs.

### *Methods of Treatment*

*Udder Infusion Study.* A dosage of between 50–400 mgm. of aureomycin per quarter per day for intramammary infusion was indicated by earlier work (*14, 15*). Each quarter of the udder of the treated cows was infused twice a day for 5 days with 100 mgm. of aureomycin HCl in 50 cc. volumes of sterile distilled water. During the course of

treatment each quarter received 1 gm. of the drug, or a total of 4 gm. per cow. Sterile bovine intravenous outfits and teat cannulas were used in administering the drug solution. After infusion the udder was gently massaged in an attempt to facilitate dispersion of the solution. Leukocyte counts (Breed method) were performed on quarter milk specimens taken before and during therapy.

*Intravenous Injection Study.* Five to 10 mgm. per kgm. of body weight was believed to represent a safe dosage (*14, 15*). The average weight of the cows was estimated at 500 kgm. Each treated cow received an initial dose of 5 gm. (10 mgm./kgm.) followed by four daily doses of 2.5 gm. (5 mgm./kgm.) in 500 cc. of sterile pyrogen-free distilled water. Each cow received a total of 15 gm. of aureomycin HCl during the 5-day course of treatment. Injection was made into the jugular vein with a gravity flow bovine intravenous outfit.

## Results

Systemic reaction to the drug was absent during and after treatment except in two cows that showed anorexia for several days during intravenous treatment, a reaction possibly due to the medication. Milk production, except for the same two animals, remained within normal limits. One animal showed a temporary discomfort due to perivascular seepage during intravenous injection. No clinical mammary gland reaction to infusion of the drug was noted.

No significant changes were observed in serum antibody levels of test or control cows in either study group during or for a 9- to 11-month observation period following treatment.

It was concluded during the guinea pig testing of milk specimens that the occurrence of spontaneous infections was not high enough to interfere with interpretation of the guinea pig test results. Of 490 guinea pigs inoculated with milk specimens, 332, or 67.7 percent, produced Q fever antibodies, while, of 119 control uninoculated guinea pigs, 3, or 2.5 percent, showed the presence of antibody.

*Udder Infusion Study.* Prior to treatment, *C. burnetii* was present in the milk of all 10 treated cows (33 quarters) and in 9 control cows (24 quarters). Tests of the milk specimens taken on the 3d and 11th days after treatment indicated that not a single cow ceased shedding organisms in the milk during the 11-day period of observation. One cow ceased shedding organisms temporarily but was shedding on the 11th day (see table). Milk of control (untreated) cows tested as composite specimens at the 11th day showed that all 9 cows were still shedding *C. burnetii* in the milk.

*Intravenous Study.* Prior to treatment, *C. burnetii* was found in the milk of all 10 treated cows (26 quarters) and 10 control cows (24 quarters). Three days following completion of treatment 9 of 10 treated cows were found to be shedding organisms. Four of five cows

tested at 14 days were also found to be shedding *C. burnetii* from one or more quarters. Five of seven cows tested 6 months later were still shedding *C. burnetii* (see table). In summary, one cow ceased shedding (3 quarters) at 3 days and remained so at 14 days, and 6 months after treatment. Another cow ceased shedding (3 quarters) between the 14th-day and 6th-month (nonlactating) tests. It was not deemed necessary to test corresponding milk specimens in control cows.

***Results of guinea pig test of cows milk before and after treatment with aureomycin***

| Type of treatment | Milk of cows positive [1] for *Coxiella burnetii* | | | |
|---|---|---|---|---|
| | Pretreatment | Post-treatment | | |
| | | 3-4 days | 11-14 days | 6 months |
| Udder treatment | 10/10 | 6/7 | 9/9 | ---------- |
| Controls | 9/10 | ---------- | 9/10 | ---------- |
| Intravenous treatment | 10/10 | 9/10 | 4/5 | 5/7 |
| Controls | 10/10 | ---------- | ---------- | ---------- |

[1] One or more udder quarters infected as indicated by the guinea pig test.
Numerator—Cows positive.
Denominator—Cows tested.
Blank—Not tested.

## Discussion

At the time these studies were initiated, one concept ascribed bovine Q fever as an asymptomatic infection localized in the mammary gland with a resultant contamination of the milk. The use of aureomycin was considered a possible means of controlling milk contamination as a source of human infection. The drug was made available for these experimental studies before bovine dosage levels or methods of administration were fully established. The possibility exists that inadequate dosages may have been used.

Intramammary infusion of the 100 mgm. of aureomycin in saline solution twice a day for 5 days failed to overcome the infection. Only 2 of the 33 quarters were cleared of organisms following treatment, one of which resumed shedding within a few days. The other quarter was not retested. The milk of not a single cow was completely cleared of organisms during the period of observation.

Leukocyte counts on individual quarters before and during the intramammary infusion study did not reveal any significant difference between the cell counts of quarters infected with *C. burnetii* and those not infected. White cell counts during treatment were higher, but clinical signs of drug irritation of the udder were lacking.

The presence of organisms in the milk may be the result of a localization of infection within the udder. The recent isolation of *C. burnetii*

in large amounts from parturient placentas of infected dairy cows suggests a multiple localization of infection within the cow. With the occurrence of multiple *C. burnetii* localization, overcoming such infections through larger intramammary doses of the drug becomes open to question.

The failure of the intravenous treatment to rid the milk of infected cows of *C. burnetii*, or to alter the blood titers over a long period of observation, indicates that aureomycin in the amounts and frequency of administration used did not overcome infection in the cows. Although 9 (9/26) infected quarters appeared negative 3 days following treatment, subsequent tests at 14 days indicated that this represented, at best, only a temporary clearing in 5 of the 9 cleared quarters. Little significance can be attributed to the fact that one cow ceased shedding from all quarters 3 days following treatment or that one ceased shedding during her "dry" period 6 months later. Spontaneous cessation as well as intermittency of shedding organisms in the milk have been previously noted. Both cows were serologically positive with equally high titers 11 months after treatment, and the placenta obtained from one of the cows 15 months following treatment was found to contain *C. burnetii.*

In considering a practical method of control of bovine Q fever, certain factors, such as the large number of infected cows, constant new infections, the difficulty of administration, and economics, serve to militate against controlling the bovine disease by therapeutic means.

## Summary

1. Thirty-nine of 40 (97.5 percent) dairy cows selected for the two treatment studies on the basis of high serum antibody levels were found to be shedding *C. burnetii* in their milk.

2. With the dosages of aureomycin used, no apparent decrease in antibodies occurred during or for a 9–11 month observation period following either intramammary or intravenous treatment.

3. Aureomycin administered by intramammary infusion (100 mgm. twice a day) for 5 days did not result in the clearing of *C. burnetii* from the milk of any of 10 treated cows during an 11-day observation period.

4. The treatment of cows by daily intravenous injection of a total of 15 gm. of aureomycin over a 5-day period failed to eliminate *C. burnetii* from the milk of 9 of 10 infected animals within 3 days, or from 5 of 7 cows tested 6 months later.

5. In light of present knowledge, certain practical limitations serve to minimize the possibility of a therapeutic control of Q fever in dairy cattle.

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# Survey of Brucellosis in Slaughtered Hogs

By Norman B. McCullough, Ph.D., M.D.*† C. Wesley Eisele, M.D.*, and Emma Pavelchek*

In a preliminary paper, the isolation of *Brucella abortus* from naturally infected hogs was reported for the first time (*1*). The recovery of *Brucella melitensis* from hogs slaughtered in a Chicago packing plant was likewise reported.

Brucellosis in swine is recognized as a disease of increasing importance in the United States. Knowledge of the extent of this disease has rested primarily upon clinical observations in hogs and limited surveys employing the agglutination test.

The present investigation was undertaken in an attempt to extend our knowledge of the species of *Brucella* infecting swine, the extent of infection, and the amount of exposure of packing-plant personnel to *Brucella*.

## Procedure

Submaxillary lymph nodes were obtained from hogs slaughtered in one of the large packing plants in Chicago. Samples were obtained each week for a period of 6 months. The lymph nodes were removed from the carcass immediately after the initial Bureau of Animal Industry inspection of head glands. Each specimen was removed with sterile instruments and placed in an individual sterile screw-capped glass jar. Upon return to the laboratory, the samples were promptly cultured. Each node was trimmed of fat and excess tissue, seared in a flame, sectioned, and the cut surface serrated and streaked directly on the surface of trypticase-soy agar medium. Sterile instruments were used throughout. The inoculated plates were incubated at 37° C. in an atmosphere of 10 percent added $CO_2$.

In cultures heavily overgrown with other organisms, *Brucella* cannot be detected. Hence, all plates showing an overgrowth were discarded and not included in the series. During the entire investigation, 152 plates were discarded for this reason. Plates streaked with nodes from which *Brucella* was not recovered have in most instances remained sterile or contained only scattered colonies of ubiquitous bacteria. Plates yielding *Brucella* have uniformly contained numerous colonies of the organism.

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Upon isolation of *Brucella*, cultures were identified by the usual methods, and the species was established by determination of $CO_2$ requirement, $H_2S$ production, growth on differential dye plates, and the use of specific absorbed typing sera. Each strain was inoculated into guinea pigs. Four weeks later the blood was tested for the presence of agglutinins; the guinea pigs were sacrificed and cultures were made of the tissues.

Due to the difficulty in keeping track of a carcass in a large plant, no attempt was made to obtain blood samples from the particular hogs cultured. During the latter part of the study, blood samples were obtained at random from 1,008 hogs over a period of several weeks. The standard test tube agglutination test was performed on each sample with incubation at 37° C. for 48 hours. The antigen used was that regularly employed in our laboratory (*2*).

## Results

Table 1 presents the results of the culture of submaxillary lymph nodes of 5,000 hogs obtained at weekly sampling over a period of 6 months. *Brucella* was isolated in 35 instances, or in 0 7 percent of the samples. Ten of the isolates were *Br. abortus*, 11 *Br. melitensis*, and 14 *Br. suis*. These strains, when subjected to the specific typing methods previously described, gave the reactions characteristic of the respective species.

*Br. abortus* was recovered on six different occasions well scattered over the period of the investigation. Similarly, *Br. melitensis* was repeatedly isolated, samples obtained on five different weeks yielding this species. *Br. suis* was isolated on seven occasions. One or more species of *Brucella* were isolated on 12 of the 26 weekly samplings.

All 35 of these strains of *Brucella* obtained from hogs were pathogenic for the guinea pig, agglutinins being produced and the organism being recovered from tissue cultures made at autopsy in all instances.

Table 2 presents the results of agglutination tests performed on samples of blood obtained at random from 1,008 hogs. Agglutinins were present in titers of 1/20 or higher in 40.28 percent of the sera, and in titers of 1/160 or higher in 6.45 percent.

## Discussion

The agglutination test as presently applied to the diagnosis of brucellosis in swine has been considered far from satisfactory. It is said that frequently hogs having this disease fail to show agglutinins. The concept has arisen that no individual hog can be considered free from the disease unless the entire herd has negative tests (*3*). Using an antigen which we have found suitable for consistently detecting agglutinins in humans and which has been well standardized against

Table 1. *Isolation of* Brucella *from submaxillary lymph nodes of hogs*

| Date | Number hogs examined | Number isolations of *Brucella* | | | |
|---|---|---|---|---|---|
| | | *Br. abortus* | *Br. melitensis* | *Br. suis* | Total |
| Nov. 2, 1948 | 85 | 0 | 0 | 0 | 0 |
| Nov. 9, 1948 | 117 | 0 | 0 | 0 | 0 |
| Nov. 16, 1948 | 198 | 1 | 0 | 0 | 1 |
| Nov. 23, 1948 | 196 | 0 | 0 | 0 | 0 |
| Nov. 30, 1948 | 192 | 2 | 0 | 0 | 2 |
| Dec. 7, 1948 | 196 | 0 | 2 | 0 | 2 |
| Dec. 14, 1948 | 188 | 1 | 0 | 2 | 3 |
| Dec. 21, 1948 | 198 | 0 | 0 | 0 | 0 |
| Dec. 28, 1948 | 204 | 0 | 0 | 0 | 0 |
| Jan. 4, 1949 | 200 | 0 | 0 | 0 | 0 |
| Jan. 11, 1949 | 197 | 0 | 0 | 0 | 0 |
| Jan. 18, 1949 | 205 | 4 | 0 | 0 | 4 |
| Jan. 25, 1949 | 206 | 0 | 0 | 0 | 0 |
| Feb. 1, 1949 | 215 | 0 | 0 | 0 | 0 |
| Feb. 8, 1949 | 205 | 0 | 0 | 0 | 0 |
| Feb. 15, 1949 | 205 | 0 | 0 | 0 | 0 |
| Feb. 21, 1949 | 220 | 0 | 5 | 1 | 6 |
| Mar. 1, 1949 | 207 | 0 | 0 | 1 | 1 |
| Mar. 8, 1949 | 205 | 0 | 0 | 1 | 1 |
| Mar. 15, 1949 | 211 | 0 | 0 | 0 | 0 |
| Mar. 22, 1949 | 212 | 0 | 0 | 2 | 2 |
| Mar. 29, 1949 | 212 | 0 | 0 | 0 | 0 |
| Apr. 5, 1949 | 200 | 1 | 1 | 5 | 7 |
| Apr. 12, 1949 | 210 | 1 | 2 | 0 | 3 |
| Apr. 19, 1949 | 202 | 0 | 1 | 2 | 3 |
| Apr. 27, 1949 | 114 | 0 | 0 | 0 | 0 |
| Total | 5,000 | 10 | 11 | 14 | 35 |

Table 2. *Results of the* Brucella *agglutination test performed on random samples of sera from slaughtered hogs*

| Number tested | *Brucella* agglutination titer | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Negative | | 1/20 | | 1/40 | | 1/80 | | 1/160 | | 1/320 or higher | |
| | Number | Percent | Number | Percent | Number | Percent | Number | Percent | Number | Percent | Number | Percent |
| 1,008 | 602 | 59.72 | 50 | 4.96 | 167 | 16.67 | 124 | 12.30 | 34 | 3.37 | 31 | 3.08 |

a battery of sera from culturally proved cases, surprisingly high incidences of positive tests and of high titers were obtained in this study.

The recovery of *Brucella* from the submaxillary lymph nodes of 35 out of 5,000 hogs (0.7 percent) should in no wise be interpreted as representing the total incidence of infection in these animals. It may, in fact, represent only those most heavily infected. When one considers the chance of recovering cultures from a single node of an infected animal, it is surprising that an incidence as high as this was found.

The regular recovery of all three species of *Brucella* in this study is noteworthy. Although *Br. abortus* in the hog had not heretofore been described, its occurrence was to be anticipated. We have observed human brucellosis due to *Br. abortus* occurring in packing-house workers where the exposure history implicated the hog as the source.

*Br. melitensis* had been reported from swine in the United States on two occasions only prior to the preliminary report of these investigations (*4*, *5*). Human epidemiological studies have now strongly implicated the hog as a source of this disease in man (*6*, *7*, *8*, *9*). Recently we have recovered *Br. melitensis* from a case of acute human brucellosis occurring in a meat inspector who worked in a Chicago packing plant. Twenty-seven days prior to hospitalization he had sustained a cut on the hand while inspecting the head glands of hogs. The cut later festered. According to the history obtained at the time of admission, fever first appeared about a week after the injury.

The lymph nodes which were cultured are those ordinarily thoroughly sectioned in the first step of the Bureau of Animal Industry inspection. Recovery of *Brucella,* at times as confluent growth, on plates streaked with these nodes implies that workers subsequently handling this area come into contact with high concentrations of *Brucella* organisms. This consideration, of course, does not imply that the head glands comprise the chief source of exposure of packing-house workers.

When one considers the incidence of high agglutinin titers found in this study, the question of exposure of packing-plant personnel to *Brucella* through the handling of hog carcasses assumes real importance. Even if the incidence of 0.7 percent culturally proved *Brucella* infection in hogs were assumed to provide the only exposure, personnel in large packing plants who routinely handle hog carcasses would come in contact with *Brucella* several times daily at least.

The repeated isolation of *Br. melitensis* emphasizes the growing public health importance of this infection in hogs.

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# Plague in the Territory of Hawaii

## I. Present Status of Plague Infection, Island of Hawaii

By BERTRAM GROSS, M. S., and DAVID D. BONNET, Ph.D.*

At the present time, plague infection in the Territory of Hawaii is found in two relatively small areas; one within the Hamakua District on the Island of Hawaii (fig. 1) and one within the Makawao District on the Island of Maui. The possibility of plague spreading from these known foci to other areas on the same island or to other islands in the Hawaiian group is a constant threat and a matter of concern to both Territorial and Federal health agencies.

The primary goal of the plague surveillance and suppressive programs on the Islands of Hawaii and Maui is to provide the people of those areas and the people of the Territory with the maximum protection against plague infection that is practicable. Therefore, it is necessary that the programs be examined and evaluated periodically to determine if the desired goals are being attained.

As described by Eskey [1] plague was first reported in the Hawaiian Islands at the port of Honolulu, Island of Oahu, in December 1899. The infection spread to the Islands of Maui, Kaui, and Hawaii within a short time, with the first human case being reported on the Island of Hawaii at the port of Hilo in February 1900. Human cases were later reported on this island from the plantation villages of Olaa located 8 miles southwest of Hilo, and Papaikou, Pepeekeo and Laupahoehoe located 5, 12, and 25 miles, respectively, north of Hilo. A total of 43 human cases were reported from these areas (table 1).

The number of plague infections which were detected in rodents in the South Hilo and Puna Districts from 1900 to 1906 is not known. Since no plague laboratory existed during this period, it is probable that the effort to determine plague in rodents was limited. In 1907 however, a plague laboratory was established at Hilo under the supervision of the United States Public Health and Marine Hospital Service with funds supplied by the Territorial Board of Health. This was the first concentrated effort to detect and prove plague infection in rodents on the Island of Hawaii. As indicated in table 2, 137 rodent infections were found within the area extending from Olaa to Laupahoehoe.

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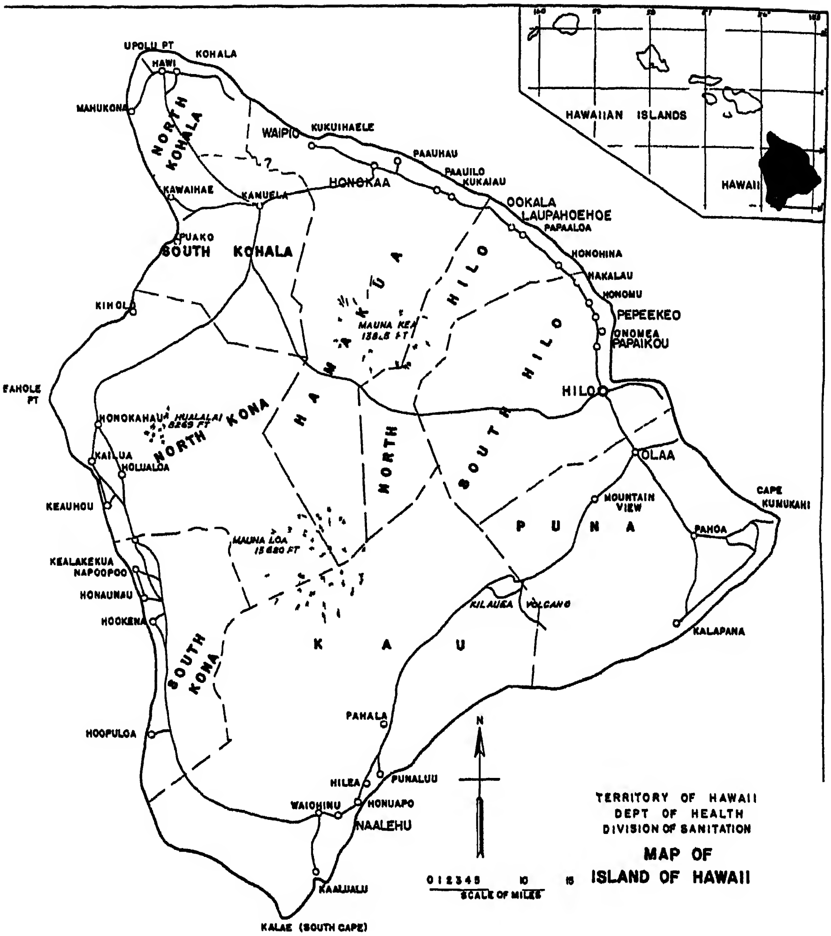


Figure 1.

Table 1. *Human plague cases in the Olaa–Laupahoehoe area* [1], *February 1900–May 1918*

| District | Village | Cases | First case reported | Last case reported |
|---|---|---|---|---|
| South Hilo | Hilo | 25 | February 1900 | March 1910 |
| | Papaikou | 2 | August 1909 | September 1909 |
| | Pepeekeo | 2 | September 1909 | September 1912. |
| Puna | Olaa | 12 | June 1905 | September 1909. |
| North Hilo | Laupahoehoe | 2 | March 1918 | May 1918 |

[1] Two off-shipping cases reported from Naalehu, District of Kau, in 1906.

Although plague in humans and rodents disappeared spontaneously from Hilo and vicinity, as noted by Eskey, and has not been detected in the Olaa-Laupahoehoe sector since 1918, this area has been under continuous surveillance. This is necessary because of the importance

Table 2. *Plague detected in rodents in the Olaa-Laupahoehoe area, August 1907–May 1918*

| District | Village | Number infections | Period |
|---|---|---|---|
| Puna | Olaa | 26 | August 1907–September 1912. |
| South Hilo | Hilo City | 91 | October 1907–February 1912. |
| | Papaikou | 4 | August 1909–September 1909. |
| | Pepeekeo | 4 | October 1909–January 1910. |
| | Honomu | 1 | October 1909. |
| | Piihonua | 2 | April 1910. |
| | Hakalau (south side) | 1 | January 1913. |
| | Wailakea | 1 | February 1913. |
| North Hilo | Hakalau | 3 | September 1909–February 1912. |
| | Laupahoehoe | 1 | May 1918. |

of Hilo as a shipping center and the former existence of plague infection in the area, and because of the spread of the disease in a northwesterly direction to the adjacent Hamakua District where it has continued to smolder since 1910.

To determine if plague infection in rodents is present in the Olaa-Laupahoehoe sector, a plague surveillance program has been maintained continually by the Territorial Department of Health. Snap traps are operated progressively throughout the City of Hilo, and particular attention is given to the port area where trapping and poisoning activities are conducted routinely in conjunction with inspection and general sanitation measures on and adjacent to the piers. Rodent retrievals are brought to the Hilo plague laboratory where they and their ectoparasites are examined for evidence of plague infection. In the plantation areas south and north of Hilo where plague was formerly found, trapping activities are carried on by plantation personnel working in cooperation with the department of health. The rodent catch is picked up daily by the department's dissector, transported to the laboratory, and examined for signs of plague.

Hundreds of thousands of rodents have been examined in the Hilo laboratory since plague disappeared from the Olaa-Laupahoehoe sector, and, to date, no evidence of a reappearance of plague in this area has been discovered.

Human plague has not been reported on the Island of Hawaii outside of the Hamakua District since 1918. (See fig. 2.) The presence of plague within this district was detected in March 1910 when a human case was reported from the village of Honokaa located 45 miles northwest from Hilo. Since that time, as shown in table 3, a total of 112 human cases have been reported from this region. Most of the cases have been reported from the area extending from Paauhau to Kukuihaele with the greatest number from the Honokaa area. Of the total number of cases reported, 108, or 96.4 percent, occurred below an elevation of 1,500 feet where approximately 90 percent of the people in this region reside or work. The remainder (3.6 percent) occurred at elevations between 1,500 and 2,000 feet. Eskey reported that there

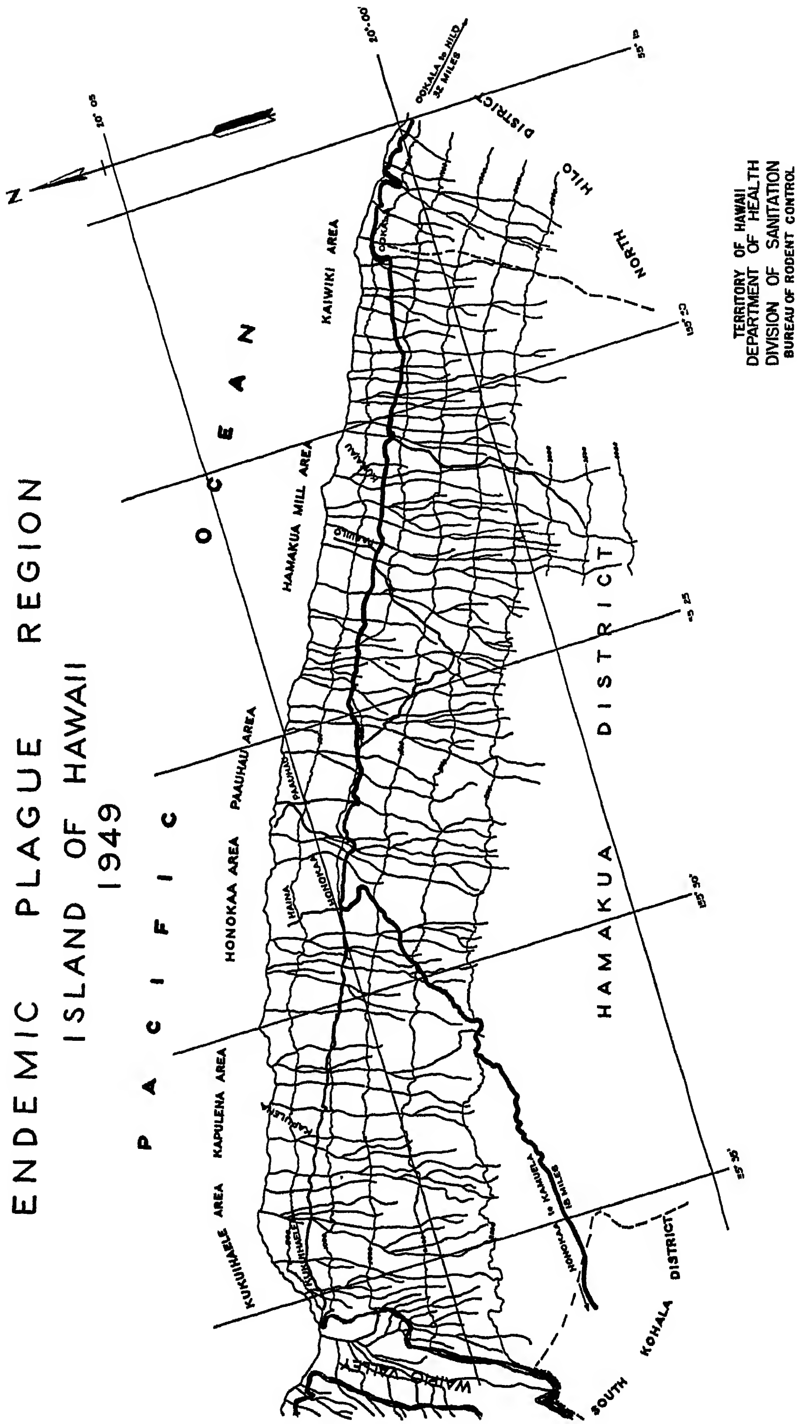
ENDEMIC PLAGUE REGION
ISLAND OF HAWAII
1949
PACIFIC OCEAN
KAIWIKI AREA
HAMAKUA MILL AREA
PAAUHAU AREA
HONOKAA AREA
KAPULENA AREA
KUKUIHAELE AREA
HAMAKUA DISTRICT
NORTH HILO DISTRICT
SOUTH KOHALA DISTRICT
WAIPIO VALLEY
OOKALA to HILO 32 MILES
HONOKAA to KAMUELA 15 MILES
TERRITORY OF HAWAII
DEPARTMENT OF HEALTH
DIVISION OF SANITATION
BUREAU OF RODENT CONTROL

Table 3. *Plague incidence, Hamakua, Hawaii, calendar years 1910–1949*

| Year | Human cases | Rodent infections [1] | Year | Human cases | Rodent infections [1] |
|---|---|---|---|---|---|
| 1910 | 3 | 8 | 1931 | 0 | 3 |
| 1911 | 5 | 3 | 1932 | 2 | 11 |
| 1912 | 7 | 86 | 1933 | 2 | 17 |
| 1913 | 4 | 15 | 1934 | 2 | 8 |
| 1914 | 4 | 3 | 1935 | 1 | 19 |
| 1915 | 4 | 12 | 1936 | 0 | 71 |
| 1916 | 0 | [2] 6 | 1937 | 0 | 93 |
| 1917 | 5 | 22 | 1938 | 0 | 130 |
| 1918 | 0 | 2 | 1939 | 1 | 54 |
| 1919 | 7 | 10 | 1940 | 0 | 56 |
| 1920 | 4 | [3] 7 | 1941 | 0 | 79 |
| 1921 | 4 | 3 | 1942 | 0 | 125 |
| 1922 | 12 | 14 | 1943 | 7 | 76 |
| 1923 | 1 | 16 | 1944 | 5 | 63 |
| 1924 | 2 | 17 | 1945 | 1 | 20 |
| 1925 | 1 | 7 | 1946 | 0 | 8 |
| 1926 | 7 | 4 | 1947 | 0 | 9 |
| 1927 | 7 | 10 | 1948 | 0 | 2 |
| 1928 | 8 | 11 | 1949 | 1 | 19 |
| 1929 | 5 | 13 | | | |
| 1930 | 0 | 4 | Total | 112 | 1,145 |

[1] Includes infections determined by tissue and flea pools.
[2] Includes one infection detected in vicinity of Ookala.
[3] Includes three infections detected in vicinity of Ookala. Politically this area is located in the North Hilo District but at present is included as part of the over-all region which is under surveillance by the Hamakua program.

was no evidence of plague above an altitude of 2,000 feet, and no additional evidence has been obtained which would alter this statement. There have been two periods of over 4 years when no human plague was reported; one of 56 months extended from March 1935 to December 1939 and one of 54 months extended from April 1945 to November 1949.

The laboratory diagnosis of plague in the Hamakua District is accomplished at the Honokaa laboratory. This laboratory has been constantly maintained by the Department of Health since it was established in May 1932. Prior to this time, with the exception of a brief period between 1911 and 1913, laboratory diagnosis was accomplished at the Hilo laboratory.

The Hamakua work district is divided into 37 work zones. A total of 1,145 plague infections in rodents or rodent fleas has been reported from 28 of these work zones extending from Ookala to and including Waipio Valley. Almost all of the infections (1,120 or 97.8 percent) have been reported from areas below an elevation of 1,500 feet, and the remainder (25 or 2.2 percent) have been from areas between 1,500 and 2,000 feet. The occurrence of rodent plague every year indicates no abatement of the infection in the region. In fact, the total number reported in recent years has been greater than the number reported prior to 1934. Although during the period 1910–46 most of the rodent plague had been found in the Paauhau, Hamakua Mill, and Honokaa areas, 31 of the last 36 rodent infections have been detected in the Honokaa, Kapulena, and Kukuihaele areas since 1946. During the 12-month period, January 1948 to February 1949, no plague was recovered

from rodents. This quiescent period was ended abruptly in February when three flea pools proved to be plague positive. Sixteen additional infections were reported in subsequent months. The first human case in 4 years was reported in November 1949.

The periodic recrudescence of human plague infection and the continued presence of plague in rodents and rodent fleas in this region necessitates the constant maintenance of a surveillance program which may serve as a basis for intensive plague suppressive measures.

# Incidence of Disease

*No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring*

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## UNITED STATES

### Reports From States for Week Ended January 27, 1951

For the current week the number of cases of measles was more than twice that for the same week last year. The largest numbers were reported in the East North Central, 1,922 cases, West South Central, 1,794, Middle Atlantic, 1,503, and Pacific States, 1,410.

The influenza cases for the country as a whole remain low, 2,455 cases as compared with 6,512 for the same week last year. The influenza-like infection reported in Gordo, Ala., last week was found to be very mild upon investigation. Material for isolation of virus was obtained from only 4 of the 250 cases reported to have occurred. The actual number of cases appears to have been overestimated. No unusual amount of respiratory disease has been noted in nearby communities.

#### Report of Epidemics

*Botulism.* Dr. W. L. Halverson, California, Director of Health, has reported one fatal case of botulism traced to a lot of Liederkranz cheese spread now called off the market. The victim had eaten about two-thirds of a jar of the cheese spread, and after an incubation period of from 8 to 10 hours, there were symptoms of nausea and vomiting followed by difficulty in swallowing. A clinical diagnosis of botulism was suggested before the patient died. Examination of the remaining contents of the jar of cheese revealed toxin and *Cl. botulinum*, type B. Records show that this cheese was manufactured in December 1949, and all of the lot bearing the number which was on the jar was shipped to California. About 40 jars have been recovered, and those which have been examined by the Food and Drug Administration have not shown evidence of botulinus toxin but did reveal the presence of some putrefactive anaerobes which have not been identified. No other cases of botulism are known to have occurred following ingestion of this food. Dr. Halverson also reported a case and one suspected case of botulism in another locality with the source of infection undetermined, and another case of unknown source in a third locality.

*Gastroenteritis.* Dr. R. M. Albrecht, New York State Department of Health, has reported an outbreak of gastroenteritis in a group of college girls. About 250 of 550 persons who ate supper in one dining hall were affected with nausea, vomiting, diarrhea, and fever after an incubation period of 10 to 14 hours. Food histories are not available, but the preliminary epidemiological investigation suggests that Swiss steak broiled in the morning and kept in a heating closet until supper may have been the source of infection.

Dr. W. L. Halverson has reported 17 cases of gastroenteritis in a California city. The symptoms were nausea, diarrhea, headache, and some fever. Some patients have been quite ill and many have had relapses.

*Diphtheria.* Dr. W. L. Halverson has reported an outbreak of eight cases of diphtheria in a single community of California. Three were children, of whom one died. The others were adults in a low socioeconomic group. There have been several suspected cases in the same area.

*False Report of Water Pollution.* The false rumor which started on January 1, 1951, in Birmingham, Ala., concerning the "poisoning" of its water supply has been investigated thoroughly by Federal, State, and local authorities. It is believed that this rumor was started by irresponsible persons who misread or misquoted a news article which had appeared a few days previously. These articles related to proposals for protection of public water supplies against pollution or sabotage. The near panic which resulted was allayed promptly by announcements from responsible health and other authorities that the water was "safe" and "pure."

*Influenza.* The United States Navy has received reports of an outbreak of influenza aboard one vessel in the Mediterranean following contact with ports of Spain. These outbreaks were characterized by their sharpness and the generally mild character of the disease. Only about one-third of the patients required bed rest of 24 hours or more. The type of virus has not been determined.

A report has been received of 40 cases of influenza on a British vessel which arrived in Havana on January 26. One death said to be due to influenza occurred while the vessel was at sea.

Information has been received from the General Register Office for England and Wales on deaths from all causes and from influenza,

| | Peak week 1950–51 | | Peak week 1949–50 | |
|---|---|---|---|---|
| | *All causes* | *Influenza* | *All causes* | *Influenza* |
| 126 large towns | 10, 328 | 1, 099 | 5, 955 | 52 |
| Northern towns | 868 | 113 | 430 | 12 |
| Northwestern towns | 2, 908 | 497 | 1, 140 | 17 |
| Liverpool (C. B.) | 949 | 216 | 245 | 4 |
| Greater London | 3, 415 | 252 | 2, 028 | 22 |

by weeks. The largest number of deaths reported in any 1 week between December 2 and January 20 as compared with peak weeks of the same period last year are shown above.

These data indicate that a more severe type of influenza has prevailed in England than was first reported, especially in the northern part of the country. For instance, in Liverpool, the number of deaths from all causes in the peak week (January 7–13, 1951) was nearly four times that for the peak week in the same period of 1949–50. Influenza deaths in Liverpool were 50 times greater when comparing the peak weeks of this year with those of last year. The mortality data which have been received also appear to indicate that the epidemic is now on the wane.

## Influenza Information Center*

The director of the regional laboratory at Berkeley, Calif., Dr. Edwin H. Lennette, reports that three cases of influenza A have been diagnosed serologically. All three are from the Berkeley area and have the onset dates of January 4, January 8, and January 9, 1951. There is no unusual prevalence of influenza in this area.

The director of the regional laboratory at Ann Arbor, Mich., Dr. Thomas Francis, Jr., reports A-prime strain of influenza virus isolated from a case with onset January 19. There is no increase in prevalence in this area.

*Comparative Data for Cases of Specified Reportable Diseases: United States*

[Numbers after diseases are International List numbers, 1948 revision]

| Disease | Total for week ended— | | 5-year median 1946–50 | Seasonal low week | Cumulative total since seasonal low week | | 5-year median 1945–46 through 1949–50 | Cumulative total for calendar year— | | 5-year median 1946–50 |
|---|---|---|---|---|---|---|---|---|---|---|
| | Jan. 27, 1951 | Jan. 28, 1950 | | | 1950–51 | 1949–50 | | 1951 | 1950 | |
| Anthrax (062) | 2 | 1 | 2 | (1) | (1) | (1) | (1) | 6 | 2 | 4 |
| Diphtheria (055) | 80 | 199 | 250 | 27th | 3,208 | 4,990 | 7,337 | 391 | 719 | 979 |
| Encephalitis, acute infectious (082) | 10 | 10 | 10 | (1) | (1) | (1) | (1) | 35 | 45 | 29 |
| Influenza (480–483) | 2,455 | 6,512 | 6,512 | 30th | [2] 22,755 | 50,007 | 53,611 | [2] 8,213 | 19,477 | 19,477 |
| Measles (085) | 9,830 | 4,580 | 6,712 | 35th | 60,108 | 36,029 | 46,409 | 31,407 | 16,899 | 20,285 |
| Meningitis, meningococcal (057.0) | 100 | 79 | 79 | 37th | 1,380 | 1,265 | 1,265 | 419 | 352 | 350 |
| Pneumonia (490–493) | 1,578 | 2,104 | ------- | (1) | (1) | (1) | (1) | 6,322 | 8,850 | ------- |
| Poliomyelitis, acute (080) | 144 | 112 | 60 | 11th | 32,812 | 41,949 | 25,090 | 593 | 475 | 299 |
| Rocky Mountain spotted fever (104) | 1 | ----- | ----- | (1) | (1) | (1) | (1) | 1 | 4 | 3 |
| Scarlet fever (050) [3] | 2,448 | 1,860 | 2,844 | 32d | [2] 23,743 | 22,605 | 32,718 | [2] 8,052 | 6,106 | 9,688 |
| Smallpox (084) | ------ | 1 | 2 | 35th | 11 | 13 | 32 | 3 | 5 | 11 |
| Tularemia (059) | 19 | 24 | 26 | (1) | (1) | (1) | (1) | 65 | 107 | 107 |
| Typhoid and paratyphoid fever (040,041) [4] | 36 | 54 | 42 | 11th | 3,087 | 3,541 | 3,566 | 172 | 168 | 166 |
| Whooping cough (056) | 1,675 | 2,888 | 2,117 | 39th | 28,483 | 30,435 | 33,354 | 6,881 | 8,899 | 8,899 |

[1] Not computed.
[2] Additions—South Carolina: Influenza, week ended Jan. 13, 24 cases; scarlet fever, week ended Jan. 20, 7 cases.
[3] Including cases reported as streptococcal sore throat.
[4] Including cases reported as salmonellosis.

*National Institutes of Health, Bethesda, Md.

## Reported Cases of Selected Communicable Diseases: United States, Week Ended Jan. 27, 1951

[Numbers under diseases are International List numbers, 1948 revision]

| Area | Diphtheria (055) | Encephalitis, infectious (082) | Influenza (480–483) | Measles (085) | Meningitis, meningococcal (057.0) | Pneumonia (490–493) | Poliomyelitis (080) |
|---|---|---|---|---|---|---|---|
| **United States** | **89** | **10** | **2,455** | **9,830** | **100** | **1,578** | **144** |
| **New England** | **5** | | **80** | **442** | **1** | **36** | **3** |
| Maine | 1 | | 76 | 3 | | 5 | |
| New Hampshire | | | | 5 | | | |
| Vermont | | | | 176 | | | |
| Massachusetts | 4 | | | 245 | | | 1 |
| Rhode Island | | | | 6 | 1 | 1 | |
| Connecticut | | | 4 | 7 | | 30 | 2 |
| **Middle Atlantic** | **10** | **1** | **7** | **1,503** | **12** | **229** | **19** |
| New York | 5 | | [1] 4 | 345 | 7 | 90 | 14 |
| New Jersey | | 1 | 3 | 326 | 2 | 67 | 1 |
| Pennsylvania | 5 | | | 832 | 3 | 72 | 4 |
| **East North Central** | **6** | **4** | **23** | **1,922** | **21** | **108** | **10** |
| Ohio | | | 20 | 556 | 11 | | |
| Indiana | 4 | | | 63 | 1 | 7 | |
| Illinois | | | 3 | 289 | 5 | 63 | 2 |
| Michigan | 2 | 4 | | 302 | 2 | 38 | 3 |
| Wisconsin | | | | 712 | 2 | | 5 |
| **West North Central** | **4** | **1** | **12** | **772** | **10** | **58** | **7** |
| Minnesota | 3 | | 1 | 85 | 1 | 12 | 1 |
| Iowa | | | | | 1 | 1 | 2 |
| Missouri | 1 | 1 | 5 | 295 | 7 | 1 | 1 |
| North Dakota | | | 2 | 23 | | 24 | |
| South Dakota | | | | 36 | | 5 | 1 |
| Nebraska | | | | | | | 1 |
| Kansas | | | 4 | 333 | 1 | 15 | 1 |
| **South Atlantic** | **18** | | **887** | **557** | **19** | **205** | **24** |
| Delaware | | | | 5 | | | 1 |
| Maryland | 1 | | 1 | 14 | 1 | 45 | 1 |
| District of Columbia | | | 6 | 22 | | 8 | |
| Virginia | 3 | | 531 | 158 | | 90 | 3 |
| West Virginia | | | 225 | 8 | 7 | 20 | |
| North Carolina | 2 | | | 173 | 8 | | 4 |
| South Carolina | 5 | | 96 | 7 | 2 | 18 | 1 |
| Georgia | 2 | | 28 | 144 | | 21 | 5 |
| Florida | 5 | | | 26 | 1 | | 9 |
| **East South Central** | **14** | | **66** | **416** | **11** | **33** | **6** |
| Kentucky | 3 | | 6 | 122 | 2 | 13 | 1 |
| Tennessee | 4 | | 58 | 161 | 3 | | |
| Alabama | 6 | | | 32 | 5 | | 2 |
| Mississippi | 1 | | 2 | 101 | 1 | 20 | 3 |
| **West South Central** | **16** | **3** | **896** | **1,794** | **12** | **709** | **17** |
| Arkansas | 3 | 2 | 667 | 126 | 1 | 91 | 4 |
| Louisiana | 2 | | | 20 | | 30 | 2 |
| Oklahoma | 3 | | 229 | 189 | 2 | 35 | |
| Texas | 8 | 1 | | 1,459 | 9 | 553 | 11 |
| **Mountain** | **9** | | **441** | **1,014** | **4** | **123** | **10** |
| Montana | 2 | | 47 | 16 | | 3 | |
| Idaho | 3 | | | 38 | 1 | | 1 |
| Wyoming | | | | 50 | | 8 | |
| Colorado | | | 129 | 674 | | 32 | 6 |
| New Mexico | 3 | | 2 | 15 | | 18 | 1 |
| Arizona | | | 263 | 174 | | 62 | 2 |
| Utah | 1 | | | 47 | 2 | | |
| Nevada | | | | | 1 | | |
| **Pacific** | **7** | **1** | **43** | **1,410** | **10** | **77** | **48** |
| Washington | 1 | 1 | 2 | 490 | 1 | 7 | 5 |
| Oregon | 1 | | 27 | 30 | 1 | 28 | 2 |
| California | 5 | | 14 | 890 | 8 | 42 | 41 |
| Alaska | | | | | | 1 | |
| Hawaii | | | 1 | 2 | | | |

[1] New York City only.

*Anthrax:* Pennsylvania, 2 cases.

## Reported Cases of Selected Communicable Diseases; United States, Week Ended Jan. 27, 1951—Continued

[Numbers under diseases are International List numbers, 1948 revision]

| Area | Rocky Mountain spotted fever (104) | Scarlet fever (050) | Smallpox (084) | Tularemia (059) | Typhoid and paratyphoid fever [1] (040, 041) | Whooping cough (056) | Rabies in animals |
|---|---|---|---|---|---|---|---|
| **United States** | 1 | 2,448 | - | 19 | 36 | 1,675 | 140 |
| **New England** | - | 259 | - | - | - | 143 | - |
| Maine | - | 19 | - | - | - | 43 | - |
| New Hampshire | - | 12 | - | - | - | 3 | - |
| Vermont | - | 7 | - | - | - | 57 | - |
| Massachusetts | - | 181 | - | - | - | - | - |
| Rhode Island | - | 11 | - | - | - | 20 | - |
| Connecticut | - | 29 | - | - | - | 20 | - |
| **Middle Atlantic** | - | 355 | - | - | 3 | 313 | 19 |
| New York | - | [2] 181 | - | - | 1 | 105 | 19 |
| New Jersey | - | 55 | - | - | - | 110 | - |
| Pennsylvania | - | 119 | - | - | 2 | 98 | - |
| **East North Central** | - | 597 | - | 1 | 2 | 250 | 16 |
| Ohio | - | 177 | - | - | - | 48 | 4 |
| Indiana | - | 40 | - | - | - | 19 | 9 |
| Illinois | - | 88 | - | 1 | - | 26 | 1 |
| Michigan | - | 245 | - | - | 2 | 74 | 1 |
| Wisconsin | - | 38 | - | - | - | 83 | 1 |
| **West North Central** | - | 133 | - | 8 | 4 | 170 | 18 |
| Minnesota | - | 33 | - | - | - | 26 | - |
| Iowa | - | 13 | - | - | - | 10 | 18 |
| Missouri | - | 29 | - | 3 | 3 | 8 | - |
| North Dakota | - | 5 | - | - | 1 | 24 | - |
| South Dakota | - | 4 | - | - | - | - | - |
| Nebraska | - | 7 | - | - | - | - | - |
| Kansas | - | 42 | - | 5 | - | 102 | - |
| **South Atlantic** | - | 222 | - | 3 | 6 | 268 | 13 |
| Delaware | - | 7 | - | - | - | 3 | - |
| Maryland | - | 28 | - | 1 | - | 11 | - |
| District of Columbia | - | 5 | - | - | - | 8 | - |
| Virginia | - | 31 | - | 1 | 2 | 76 | 1 |
| West Virginia | - | 11 | - | - | - | 17 | 1 |
| North Carolina | - | 78 | - | 1 | 2 | 89 | - |
| South Carolina | - | 6 | - | - | - | 5 | 7 |
| Georgia | - | 37 | - | - | 2 | 30 | 3 |
| Florida | - | [2] 19 | - | - | - | 29 | 1 |
| **East South Central** | 1 | 136 | - | 3 | 8 | 84 | 28 |
| Kentucky | - | 30 | - | - | - | 12 | 12 |
| Tennessee | 1 | 92 | - | - | 5 | 25 | 10 |
| Alabama | - | 13 | - | - | 1 | 46 | 5 |
| Mississippi | - | 1 | - | 3 | 2 | 1 | 1 |
| **West South Central** | - | 119 | - | - | 8 | 291 | 43 |
| Arkansas | - | 8 | - | - | 2 | 22 | 3 |
| Louisiana | - | 17 | - | - | 1 | 2 | - |
| Oklahoma | - | 19 | - | - | 1 | 33 | 1 |
| Texas | - | 75 | - | - | 4 | 234 | 39 |
| **Mountain** | - | 208 | - | 4 | 3 | 90 | 1 |
| Montana | - | 30 | - | 3 | - | 10 | 1 |
| Idaho | - | 31 | - | - | - | 16 | - |
| Wyoming | - | 1 | - | - | - | 4 | - |
| Colorado | - | 20 | - | - | - | 21 | - |
| New Mexico | - | 3 | - | - | - | 14 | - |
| Arizona | - | 8 | - | - | 2 | 25 | - |
| Utah | - | [2] 115 | - | 1 | 1 | - | - |
| Nevada | - | - | - | - | - | - | - |
| **Pacific** | - | 419 | - | - | 2 | 66 | 2 |
| Washington | - | 122 | - | - | - | 14 | - |
| Oregon | - | 43 | - | - | - | 12 | - |
| California | - | [2] 254 | - | - | 2 | 40 | 2 |
| Alaska | - | 1 | - | - | - | 4 | - |
| Hawaii | - | 3 | - | - | - | - | - |

[1] Including cases reported as salmonellosis.

[2] Including cases reported as streptococcal sore throat.

# FOREIGN REPORTS

## CANADA

*Reported Cases of Certain Diseases—Week Ended Jan. 6, 1951*

| Disease | Total | Newfoundland | Prince Edward Island | Nova Scotia | New Brunswick | Quebec | Ontario | Manitoba | Saskatchewan | Alberta | British Columbia |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Brucellosis | 4 | | | | | | 2 | 1 | | | 1 |
| Chickenpox | 1,475 | | | 42 | | 238 | 719 | 40 | 145 | 86 | 205 |
| Diphtheria | 6 | | | | | 3 | | 2 | 1 | | |
| Dysentery, bacillary | 10 | | | | | 1 | 2 | | | | 7 |
| German measles | 268 | | | | | 10 | 146 | 1 | 6 | 30 | 75 |
| Influenza | 11 | | | 6 | | | 1 | 3 | | | 1 |
| Measles | 2,390 | 11 | | 7 | 3 | 168 | 2,015 | 134 | 17 | 11 | 24 |
| Meningitis, meningococcal | 5 | | | | | | 3 | | | 1 | 1 |
| Mumps | 1,461 | 2 | | 27 | | 136 | 590 | 35 | 212 | 262 | 107 |
| Poliomyelitis | 1 | | | | | | | | | | 1 |
| Scarlet fever | 280 | 1 | | | | 51 | 62 | 10 | 23 | 80 | 38 |
| Tuberculosis (all forms) | 215 | 5 | | 2 | 11 | 148 | 19 | 13 | | | 17 |
| Typhoid and paratyphoid fever | 16 | | | | | 13 | 1 | | | | 2 |
| Venereal diseases: | | | | | | | | | | | |
| Gonorrhea | 333 | 5 | | 1 | 5 | 124 | 40 | 22 | 20 | 38 | 78 |
| Syphilis | 71 | 5 | | | | 30 | 19 | | 4 | | 13 |
| Primary | 9 | | | | | 5 | | | 2 | | 2 |
| Secondary | 6 | | | | | 2 | 3 | | | | 1 |
| Other | 56 | 5 | | | | 23 | 16 | | 2 | | 10 |
| Whooping cough | 236 | | | 5 | 4 | 62 | 122 | 16 | 1 | 3 | 23 |

## NORWAY

*Reported Cases of Certain Diseases—November 1950*

| Disease | Cases | Disease | Cases |
|---|---|---|---|
| Diphtheria | 22 | Pneumonia (all forms) | 5,522 |
| Dysentery, unspecified | 6 | Poliomyelitis | 116 |
| Encephalitis, infectious | 6 | Rheumatic fever | 85 |
| Erysipelas | 323 | Scabies | 1,037 |
| Gastro-enteritis | 2,251 | Scarlet fever | 151 |
| Hepatitis, infectious | 40 | Tuberculosis (all forms) | 289 |
| Impetigo contagiosa | 2,142 | Typhoid fever | 1 |
| Influenza | 27,089 | Venereal diseases: | |
| Malaria | 1 | Gonorrhea | 181 |
| Measles | 721 | Syphilis | 57 |
| Meningitis, meningococcal | 21 | Other forms | 1 |
| Mumps | 62 | Whooping cough | 1,754 |
| Paratyphoid fever | 1 | | |

## MADAGASCAR

*Reported Cases of Certain Diseases and Deaths—November 1950*

| Disease | Aliens | | Natives | |
|---|---|---|---|---|
| | Cases | Deaths | Cases | Deaths |
| Bilharziasis | | | 19 | |
| Diphtheria | | | 2 | |
| Dysentery: | | | | |
| Amebic | 1 | | 151 | 4 |
| Bacillary | | | 23 | 1 |
| Erysipelas | | | 6 | |
| Influenza | 1 | | 2,679 | 10 |
| Leprosy | | | 49 | |
| Malaria | 116 | 2 | 24,070 | 128 |
| Measles | 3 | | 160 | 1 |
| Meningitis, meningococcal | | | 5 | 1 |
| Mumps | 6 | | 103 | |
| Plague | | | 29 | 22 |
| Pneumonia (all forms) | 3 | 1 | 807 | 69 |
| Puerperal infection | | | 3 | |
| Relapsing fever | | | 1 | |
| Tuberculosis, respiratory | 8 | 3 | 101 | 16 |
| Typhoid fever | | | 6 | 3 |
| Whooping cough | 1 | | 223 | 3 |

## REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

The following reports include only items of unusual incidence or special interest and the occurrence of these diseases, except yellow fever, in localities which had not recently reported cases. All reports of yellow fever are published currently. A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

### Cholera

*India.* During the week ended January 20, 1951, 76 cases of cholera were reported in Calcutta, as compared with 41 for the previous week. In Negapatam 15 cases were reported for the week ended January 20, as compared with 10 for the previous week.

### Smallpox

*Belgian Congo.* During the week ended January 13, 1951, 47 cases of alastrim were reported in Belgian Congo. For the week ended January 6, 64 cases were reported.

*Cameroon (British).* For the week ended December 2, 1950, two cases of smallpox were reported in Victoria.

*French Equatorial Africa.* During the period December 21–31, 1950, five cases of smallpox were reported in French Equatorial Africa. These are the first cases since September 20.

*India.* For the week ended January 20, 1951, smallpox was reported in ports of India as follows: Calcutta, 401 cases; Madras, 75; and Bombay, 44.

*Iraq.* For the week ended January 20, 1951, 31 cases of smallpox were reported in Iraq, as compared with 10 for the week ended January 13.

*Tanganyika.* During the week ended December 16, 1950, 42 cases (8 deaths) were reported in Tanganyika.

**Typhus Fever**

*Indochina.* For the week ended January 13, 1951, two cases of typhus fever were reported in Viet Nam.

*Puerto Rico.* Two cases of murine typhus fever were reported in San Juan for the week ended December 2, 1950.

*Turkey.* During the week ended January 20, 1951, one case of typhus fever was reported in Istanbul.

+ + +

The printing of this publication has been approved by the Director of the Bureau of the Budget (August 10, 1949).

The PUBLIC HEALTH REPORTS, first published in 1878 under authority of an act of Congress of April 29 of that year, is issued weekly by the Public Health Service through the Division of Public Health Methods, pursuant to the following authority of law: United States Code, title 42, sections 241, 245, 247; title 44, section 220.

It contains (1) current information regarding the incidence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

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# Public Health Reports

VOLUME 66 FEBRUARY 23, 1951 NUMBER 8

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FEDERAL SECURITY AGENCY

PUBLIC HEALTH SERVICE

FEDERAL SECURITY AGENCY
*Oscar R. Ewing, Administrator*

PUBLIC HEALTH SERVICE
*Leonard A. Scheele, Surgeon General*

Division of Public Health Methods
*G. St. J. Perrott, Chief of Division*

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# Public Health Reports

*Vol. 66* • FEBRUARY 23, 1951 • *No. 8*


## The Health of Ferrous Foundry Workers


By Harry Heimann, M. D.*


Studies of the health of ferrous foundry workers have been made during the past two decades in many parts of the world (*1–30*). In most reports of such studies the dust hazard received major consideration. In spite of the many investigations and the recommendations made, the dust hazard still appears to be a real one. This was especially brought to our attention by health officials of three Midwestern States.

These officials observed that, in their respective jurisdictions, claims for silicosis among workers in the ferrous foundry industry were continuing in spite of apparent improvement of environmental conditions. They, therefore, requested that the Public Health Service investigate the matter. Following preliminary conferences with these officials and others concerned, it was agreed that the Public Health Service would, with the cooperation of the States, study the health status of the workers in the industry with special emphasis placed on certain diseases which might be caused by the occupation. It was further agreed that the study would be made in Illinois with the aid of the State Department of Public Health.

### Review of the Literature

Some studies have been made of the general health of ferrous foundry workers, the most notable examples being those of Collis (*31*) and of Macklin and Middleton (*13*) in Great Britain; these give major emphasis to the lung diseases. Many other studies have been made of the pulmonary diseases in foundry workers. Although the previous reports served well the purpose for which they were intended, only for a limited number may comparisons for incidence of pulmonary fibrosis be made with the present report. Further, in some instances, license was used in reviewing and making interpretations from the published

*Senior Surgeon, Division of Industrial Hygiene, Public Health Service. Presented before the American Conference of Governmental Industrial Hygienists, Chicago, Ill., April 25, 1950. This is a condensation of a report published as Public Health Service Publication No. 31, The Health of Ferrous Foundry Workers in Illinois, February 1951.

reports as to the occurrence of diffuse or nodular fibrosis. In general, however, it is felt that our interpretations were made without bias so that an approach to comparison with our data might be made. It was found that the incidence of diffuse fibrosis was reported as ranging from 3.3 to 22 percent, and nodular fibrosis from 0 to 17.5 percent. Conglomerate silicosis was observed only rarely. It is, of course, understood that not many cases of stage three silicosis would be found in such studies since they were made of persons who were working at the time of the examinations.

## Objectives of the Study

The present investigation was undertaken to obtain information on the health status of ferrous foundry workers with special emphasis on the effects of the occupational environment, the ultimate objective being to find ways and means of improving that environment. For these reasons, the medical team assigned to the work obtained data on the health of the workers, and the engineering staff collected data on the environment. The correlation of the two sets of data, it was expected, would yield significant information.

## Methods of Study

### *Selection of Foundries*

Engineering studies were made in 18 foundries. Satisfactory medical data were collected for only 16, and these, therefore, will be discussed. The 16 foundries studied typified the industry medically, at least in Illinois. The selection of foundries was made after thorough review by the State Department of Public Health of all the ferrous foundries in the State. The final selection of the plants for study was based on an effort to obtain examples of different types of ferrous foundries, that is, small and large, mechanized and nonmechanized, gray iron and steel, and patently dirty or clean. In the 16 foundries discussed, the total employment was a little over 2,000, of which 1,937, all males, were studied.

### *Methods of Medical Examination*

Medical histories, as well as occupational histories, were taken, and physical examinations were performed by the physicians. Chest roentgenograms were made on 14- x 17-inch films. Examination of the oral structures was done by dentists. Medical technicians did routine urine analyses, and checked for microscopic findings in the urines showing albumin. The technicians also obtained 10 cc. of venous blood, 5 cc. of which was used for the Kahn serological test for syphilis and the remaining 5 cc. added to a suitable anticoagulant.

Blood smears were made of fresh blood. Erythrocyte and leukocyte counts were done by standard methods and the hemoglobin estimation by the Haden-Hausser hemoglobinometer. The erythrocyte sedimentation rate was obtained by using Wintrobe tubes, the reading being taken at the end of 1 hour. Hematocrit determinations were done on the same blood samples, the blood being centrifuged for 30 minutes at 2,500 revolutions per minute. Vital capacity estimations were done with a water replacement type of spirometer, three tests being made for each worker and the highest recorded as vital capacity.

### *Summary of Engineering Findings*

The engineering phases of this investigation were made by using standard methods. Over 1,000 dust counts were made in the 18 foundries studied by the engineers. Free silica determinations were made for about 50 samples of airborne dust and for about 60 samples each of settled dust and the parent materials. Iron determinations of airborne dust were made for about 60 samples. A preliminary report of the engineering findings was presented at the 1949 annual meeting of the American Industrial Hygiene Association. Further study led to the following summarized data.

1. It was found that 90 percent and more of the airborne dust was 3 micra or less in particle size in all foundry environments.

2. The amount of free silica in the airborne dust varied with the operation and ranged from 13 percent at coremaking to 29 percent at pouring, shakeout, and sand conditioning. On the other hand, the free silica content in the settled dust was found to be uniformly 30 percent throughout the foundry.

3. The free silica in that portion of the airborne dust of less than 5 micra in size varied from 6 to 33 percent.

4. The percentage of iron in the airborne dusts was found to be low, ranging from 3 to 9 percent, for all operations except casting cleaning. For the latter, the proportion of iron was found to vary from 30 to 38 percent.

5. Operational dust levels at various foundry activities in general were found to be much lower than those reported in earlier investigations.

## Results—General Characteristics

The median age of the foundrymen examined was 40.7 years—similar to that of other heavy industries we have studied. Although the present investigation limited its examination to males, women are employed in foundry industries and constitute about 5 percent of the production force. Thirty-one percent of the present study group were Negroes.

The hours of work per week generally averaged about 40. Since, of the foundrymen studied, 12.5 percent had been employed 30 years or more, 24.8 percent, 20 years or more, and 45.1 percent, 10 years or more, it is believed that we had an adequate sample from the point of view of years of exposure in the industry.

Questioning of the men about their occupations before coming into foundry work elicited the fact that approximately 4 percent came from trades where there might have been excessive dust in the occupation. This matter will be discussed further.

Consideration of each of the job classifications separately, in the correlations with the medical findings, would have resulted in such small numbers of workers as to make such correlation of doubtful value. For this reason, the job classes were grouped into larger segments. This classification has the further advantage that, essentially, the environmental conditions are relatively similar in at least the first four groups for the job classes. The six major occupational classes listed are coremakers, molders, cleaners and finishers, shakeout men, maintenance and supervisory employees, and laborers and others. Careful analysis was made of each history obtained and the principal occupation was determined. The present occupation, of course, was easily observed from those records. The principal occupation represents the particular broad occupation followed for the greatest number of years during work in foundries. There appeared to be a tendency for the present occupation to have less molders and cleaners and finishers, and more of the groups of maintenance and supervisory workers and of laborers. In further evaluating the relationship of present to principal occupation of the individual foundryman, it was found that, in general, in over 80 percent of instances the present and principal occupations were identical.

## Medical Findings

In considering the medical observations made in this study, only those which in our opinion were of immediate consequence to the problem at hand will be discussed. The remaining data will be presented in separate communications.

### *Oral Findings*

In the examination of the oral structures, attention was paid to conditions of the lips, oral mucosa, peridontal tissues, palate, velum, uvula, glands, tongue, and mandible, as well as the teeth. In general, conditions of the oral structures were found to be similar to other studies made by us in the past, except for the presence of attrition.

Attrition of the occlusal surfaces of the teeth, when compared with the incidence of this condition in similar groups of workers who were

not exposed to a hard gritty substance in the environmental air, was of greater frequency among the ferrous foundrymen. Further comparison made for this condition among the various occupational groups showed a direct relationship of the incidence of attrition to the dustiness of the environmental air. It appears, therefore, that ferrous foundrymen develop attrition of the teeth which is caused by the dustiness of the occupation.

### *Eye Studies*

Tests for acuity of distant vision were made of 1,742 foundrymen by using the Keystone Telebinocular (*32*). All tests were done with the worker wearing the corrective spectacles he usually wore at his work. This served the purpose of testing the visual acuity which he had at his usual occupation.

Study of the distribution of the visual acuity findings, divided according to the dustiness of the industrial exposure and according to the presence in the workroom air of high-speed particles involved in the operation concerned, appeared to show no differences. In this evaluation no weight was given to the wearing of eye protective equipment, although it is recognized that such equipment when properly worn will appreciably lower the incidence of eye injuries.

To further test the possibility that the degree of dustiness of the occupation may have caused damage to the eyes, the incidence of certain eye symptoms and signs was correlated with the occupations of the foundrymen at the time of the examination. It was found that neither the symptom of photophobia nor the objective sign of conjunctival congestion was significantly related to any of the six major job categories in spite of the fact that the dustiness of these job categories varied.

### *Hernia*

Inguinal hernia of one or both sides was diagnosed by observation and palpation of the scrotal sac, as well as of both inguinal canals, with the worker in the standing position. Such hernia either existed in the past or was found at the time of the examination in 11 percent of the workers. Considering the men having hernia from the point of view of their occupations, it was found that there were essentially no differences in incidence of the condition among the various occupational groups.

Inguinal hernia was found by the medical examination alone in 2.3 percent of the workers. In a large series of iron and steel workers recently reported, the incidence of hernia on examination was 4.3 percent (*33*). The differences in the findings of the two series of men may possibly have been due to the differences in the examiners and the criteria used in the two studies.

*Skin*

Interpretation of the dermatologic data from the medical records showed that 251 foundrymen had some type of skin disease at the time of the examination. Of these, the skin disease was most likely industrial in origin for 33, or 1.7 percent, of the total examined. These were distributed as follows: occupational contact dermatitis, 12 cases; heat rash, 18; and occupational acne, 3. These cases were distributed in a random manner through all the occupational groups.

In the course of the study, one of the plants had an outbreak of contact dermatitis, the cases of which are not included in the above summary. All occurred among coremakers and were shown by patch tests to be due probably to a phenol-formaldehyde resin which was being newly used as the sand binding material. With the institution of the customary protective measures, such as protective clothing, barrier creams, and personal cleanliness, new cases ceased to occur. It may be of interest to observe that, since the completion of the field studies of this investigation, other instances of dermatitis outbreaks among coremakers have come to the attention of the Public Health Service. In all cases, the further occurrence of disease was halted by the institution of protective measures.

## Cardiovascular-Renal Disease

*Blood Pressure*

Blood pressure readings were made after a 5- to 10-minute rest period with the worker seated. With the data corrected for age, a positive association between elevated blood pressure of 100 mm. or more diastolic or 160 or more systolic was found for increasing degrees of pulmonary fibrosis. The reason for this is not apparent at this time.

The cardiac status in silicosis has been a controversial matter for many years (*34–46*). However, this has centered about right-sided cardiac hypertrophy due to advanced silicosis, that is, conglomerate silicosis. In the present study, only one case of this stage of the lung disease was observed, and, thus, it would not be expected that cardiac complications would be prominent.

In addition to the blood pressure records, the medical study included, in the single examination of each worker, the following for evaluation of the cardiac status: (1) the medical history; (2) medical examination including palpation and auscultation of the heart; (3) blood Kahn serological test for syphilis; and (4) the chest roentgenogram taken at 6-foot target distance. Diagnosis of heart disease, of course, requires other data such as an electrocardiogram as well as studies of the worker on more than one occasion. With the limitations imposed on us by these facts, each clinical record was reviewed and an

opinion recorded as to the probable presence or absence of heart disease and, if heart disease was suspected, a record was made of its etiological diagnosis according to the criteria of the New York Heart Association (*47*). It was found that the data were, in general, similar to the cardiac findings in other studies we have made in recent years.

*Blood Studies*

It appeared that the erythrocyte counts in the present study group were significantly lower than in a group of open-hearth steelworkers studied.[1] On the other hand, the total leukocyte counts of the foundrymen compared with those of the open-hearth steelworkers were not significantly different. The data indicated that the hemoglobin values for the foundrymen were significantly lower than those for the open-hearth steelworkers. Correlations of erythrocyte counts, leukocyte counts, and hemoglobin estimations, respectively, showed no association with occupation. Since lowered erythrocyte counts and hemoglobin estimations were found for the total foundry population studied and when compared with open-hearth steel men and specific occupations in the foundry did not account for the difference, it would appear that factors other than the industry were probably responsible for this situation. Thus, dietary or geographic differences between the two groups may have been responsible for the blood variations. Hematocrit levels and erythrocyte sedimentation rates for the total group showed no difference from other groups studied.

*Vital Capacity*

Estimation of pulmonary failure based on vital capacity is at best a doubtful procedure. However, since the use of the finer methods of measuring the pulmonary capacity and its various components was not feasible in this study, it was believed that vital capacity studies might be of some value. Compared with those of a recent study of a worker group in which no similar pulmonary dust hazard existed in the occupation, and correcting for age, no appreciable differences in vital capacity were observed.

*Chest Roentgenograms*

In evaluating the effect of dust on the lungs, the chest roentgenogram is of paramount importance. This is especially true in exposures to silica dust, as in the present study. Many investigations of the effects on the lungs of silica dust inhalation have amply documented the importance of the roentgenographic findings. It is not to be inferred, however, that correlative medical data such as medical history and physical examination as well as occupational history are

[1] Health of Workers Exposed to Sodium Fluoride at Open Hearth Furnaces. Division of Industrial Hygiene, Public Health Service, 1948, 64 pp.


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to be disregarded. On the contrary, these data are of great significance, especially for differential diagnosis.

All films taken in this study were interpreted by each of two physicians working independently. Where difference of opinion of the interpretation existed, it was resolved by conference between the two interpreters. Assistance from experts in the field of pulmonary tuberculosis studies was obtained for reading of the films suspected of showing disease.

As in previous studies of the industrial pulmonary dust diseases made by the Public Health Service, the findings were classified according to intensity of linear fibrosis, appearance of graininess (ground glass), and nodulation. The chart shows graphically the scheme used to represent the various stages in the progression of the pulmonary fibrotic state due to silica dust inhalation.

Generally, films indicated as normal, linear exaggeration one, and

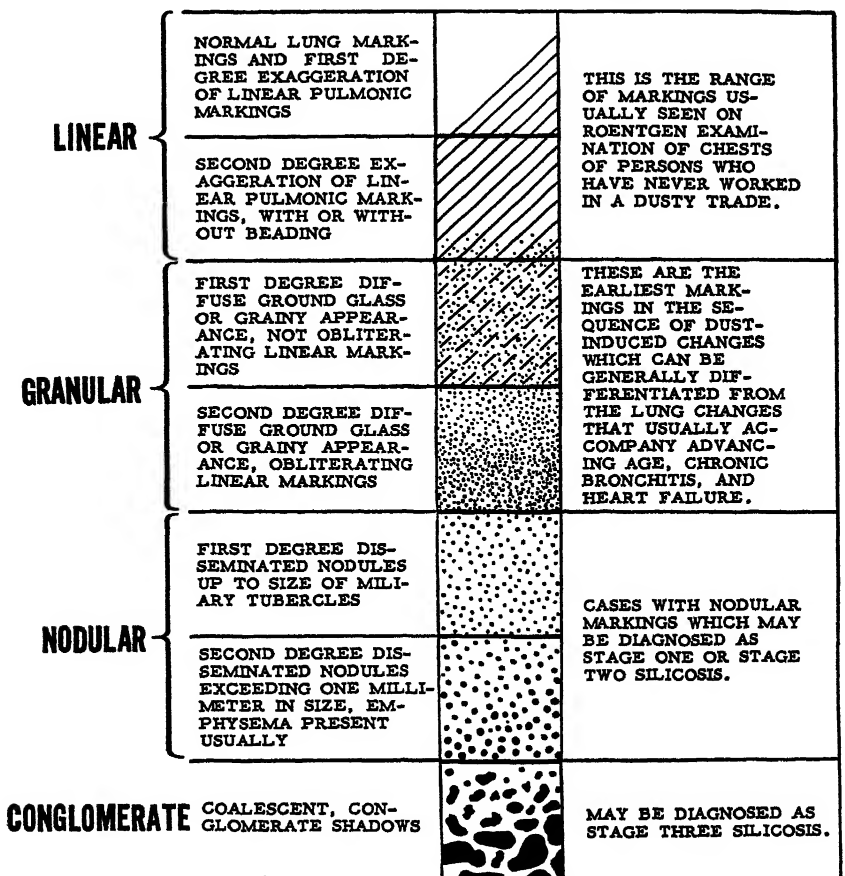


**Figure 1. Scheme representing the sequence of lung-field markings in a typical case of uncomplicated silicosis.**

linear exaggeration two may be considered as being within normal limits or due to lung changes unrelated to the dustiness of the occupational environment. The ground glass one appearance may or may not be due to the dust in the environment. Films showing the ground glass two appearance are strongly suggestive of an effect due to the dust of the occupational environment, when there is a history of exposure to silica dust and other medical findings are essentially negative. Generalized nodulation and conglomerate masses of nodules appearing in the roentgenogram, together with the supporting data of an occupational exposure to silica dust and the other pertinent medical data, signify lung changes due to the dust. In the present study 140 persons, or 7.7 percent, showed ground glass two lung markings, and 28, or 1.5 percent showed nodular fibrosis. Of the latter, 24 had stage one nodular, 3 had stage two nodular, and 1 had stage three, or conglomerate silicosis.

The medical records of the 28 persons whose chest roentgenograms showed nodular fibrosis revealed the following data of importance. The men, all white workers, ranged in age from 45 to 73 years, with 15 in the sixth, seventh, or eighth decade. The absence of nonwhite workers in this series may possibly be explained by the fact that such workers had spent a significantly lesser number of years in foundry work as observed in this study.

Examination of the occupational histories of the group revealed that 18 were gray-iron workers and 10 steel foundry workers, a ratio similar to that of these groups in the entire study. Of the 18 iron workers, 14 had the principal occupation of molder. Of the steel foundrymen, 9 were cleaners and finishers. The time spent in the principal occupation by each of the men approximated closely the total years each had spent in foundry work, and was 14 to 52 years with the exception of two men. Of the latter two, one had 13, and the other 5 years of foundry experience. The first of these had been a burner for a significant part of his life in foundry work and may fall into the category of persons exposed to appreciable amounts of iron fume, a group so well described by Hamlin (*48*). The second worker's experience in the foundry was allegedly 5 years, but his work and occupation histories were considered unreliable.

Three of the workers with nodular fibrosis gave a history of probably significant inorganic dust exposure in other industries and occupations prior to their foundry experience; one in brick and tile manufacture, one as a welder, and the third in a brick yard.

It appeared that for the iron foundrymen the molders have a higher incidence of nodular silicosis, whereas for the steel workers the cleaners and finishers have the higher incidence. The high incidence rate for the molders may be due to their longer exposure.

The criteria for interpreting the stage of re-infection type of pul-

monary tuberculosis in this study were those of the National Tuberculosis Association (*49*). The degree of activity of the cases was classified as probably active, probably inactive, or doubtful, depending upon the general characteristics of the roentgenographic shadows, as well as upon the clinical data. Pulmonary tuberculosis was thus suspected from the roentgenograms in 25 workers. Careful review of the clinical records of the workers and the roentgenograms revealed that the disease was probably active in 5, probably inactive in 8, and of doubtful activity in 12. It is recognized that activity of pulmonary tuberculous lesions cannot be evaluated on the basis of one roentgenographic examination and one medical examination, especially in the absence of sputum studies. The data concerning the findings for pulmonary tuberculosis must, therefore, be accepted with caution. Further, in at least some instances, the worker may have had the disease before his employment in the foundry industry. This factor could not be evaluated since pre-employment chest roentgenograms were not available to us.

Re-infection type of the disease was found in 21 white workers and in 4 nonwhite, which yields a rate of 0.7 percent for the white and 1.7 percent for the nonwhite workers. For the area in which this study was made, the rates for suspected pulmonary tuberculosis, based upon almost 300,000 roentgenograms, has been reported as 1.75 percent for white adults of both sexes and 1.32 percent for the nonwhite (*50*).

The relationship of the dustiness of the occupation in the foundry industry to the incidence of pulmonary tuberculosis has been discussed by many investigators (*4–6, 51–54*) and is thus of great interest. In the present study, the relationship of pulmonary tuberculosis incidence to that of pulmonary fibrosis was tested for significance, and none was found. In the same vein, it is noted that tuberculosis infection was not observed as a complication among the 28 workers who had nodular silicosis.

Study was made to determine whether or not dustiness of occupation was itself associated with an increased incidence of pulmonary tuberculosis. Comparison thus was made between the two categories of cleaners and finishers, and coremakers, the former being exposed to appreciably more dust than the latter. It was found that, for those in these two work categories whose roentgenograms showed markings read as normal, linear one, and linear two—conditions regarded as being unrelated to the dust—no differences existed for the incidence of pulmonary tuberculosis. This was found for those with less than 10 years in the occupation as well as for those whose work experience extended beyond 10 years. These data indicated that dustiness of occupation, as it occurred in the ferrous foundry industry, was probably not associated with a greater or less likelihood for the development of pulmonary tuberculosis.

X-ray evidence of pulmonary tuberculosis was found more frequently among the steel than the gray-iron foundrymen. Thus, although the steel foundrymen made up 30 percent of the total study group of 1,937 men, they constituted 60 percent of the cases of tuberculosis.

At this point it might be well to consider the subject of iron deposition in the lungs and its possible relationship to the roentgenographic appearance of silicosis, a matter which has evoked international interest for some years. The earliest notation on this point we could find in medical literature is that in 1919, Holland (*55*), in a personal communication, mentioned this possibility since he recognized the relative opacity of iron to roentgen rays. Holland's reference was to the possible occurrence of this condition in iron miners. The occupation of iron mining was, thus, the first industry in which this possibility was considered. Other occupations receiving attention in this regard have been welding, silver polishing, boiler scaling, and, finally, work in the foundry.

Review of the literature on this subject leads us to the following deductions: (1) Electric arc welders exposed to high concentrations of welding fumes may develop iron deposition in the lungs which, in some instances, is roentgenographically difficult to distinguish from nodular silicosis but which is not associated with pulmonary fibrosis; (2) in exposure to iron and silica dust together, there may be a modification of the fibrotic process by the simultaneous presence of the two agents, the iron causing a slowing of the fibrotic process; (3) to our knowledge, there are no post-mortem data for humans to indicate that the exposure to iron dust in foundries modifies the action of the silica exposure.

In the present investigation the matter of iron deposition in the lungs received limited attention. The incidence of various degrees of pulmonary roentgenographic markings was compared for cleaners and finishers, and sandblasters, the former being exposed to relatively higher levels of iron dust. This comparison failed to show that the exposure to larger amounts of iron resulted in appreciably more marked pulmonary roentgenographic markings.

### *Pulmonary Fibrosis and Previous Work History*

As mentioned, there were 73 foundrymen, approximately 4 percent, whose work histories included periods of employment in dusty trades other than foundry work. The medical and historical data for each of these men were carefully reviewed. On the basis of the general knowledge of the probable dustiness of their former trades, as well as upon the time spent in the former and present occupations, efforts were made to determine what influence the former dusty occupation may have had upon the degree of pulmonary fibrosis observed in the

present study. It was believed that in only a relatively small number was there a likelihood that the former occupation was etiologically of importance. All of these had ground glass roentgenographic changes, some having ground glass one, and some, ground glass two. In the entire study, ground glass one roentgenographic changes were present in 375 instances and ground glass two in 140.

On the basis of the foregoing data it is not felt that previous occupation in dusty trades, other than in ferrous foundries, had a significant influence on the degree of pulmonary fibrosis observed in this study. Further evidence lending support to this observation was found by comparing the frequency in the study of the occurrence of previous dusty occupations of groups showing varying degrees of pulmonary fibrosis.

*Pulmonary Fibrosis and Occupation*

It was found that pulmonary fibrosis of the degree of ground glass two and nodular fibrosis occurred in 10.0 percent of all the gray-iron workers and 7.9 percent of steel workers; the difference between these two incidence rates was not statistically significant, a finding which is at variance with other studies (*2*, *7*, *9*, *21*). The average years of exposure of gray-iron foundrymen and steel foundrymen was approximately the same for both in this study. In both types of ferrous foundry workers, there was a progressive increase of incidence rates with increased years of exposure.

Since data for exposure levels to dust, percentage of free silica, percentage of iron, and particle-size determinations were available for only three steel foundries, we believed that further comparison among the occupational groups of steel and gray-iron foundrymen was unwarranted. Comparison, however, was made among the occupational groups of gray-iron workers since useful environmental data for this purpose were available. It is well to note in this connection that such data for maintenance and supervisory workers, as well as the group of laborers and others, were of doubtful value since each of these was heterogenous in terms of the nature of occupational exposures.

All other factors being equal, it might be expected that the frequency rate of pulmonary fibrosis would be in direct proportion to the dustiness of the occupation. In the gray-iron foundrymen, among the four occupational groups of shakeout men, molders, cleaners and finishers, and coremakers, the incidence rates of pulmonary fibrosis show a trend in the expected direction; that is, as the weighted dust exposures decrease, the rates for pulmonary fibrosis decrease. This trend is probably somewhat more apparent when the groups of molders, and cleaners and finishers, the two occupational classes having similar dust exposures, are considered together.

It is pointed out that the higher incidence rates for fibrosis among the gray-iron molders than among the cleaners and finishers, both being exposed to the same level of dustiness, was in part due to the fact that the molders had longer years of experience in their occupation. Further, the iron content was appreciably higher for the cleaners and finishers than it was for the molders. The part that iron itself may have played in the observed roentgenographic appearance cannot be evaluated at this time. This matter was discussed in detail above.

### *Pulmonary Fibrosis and Blood Findings*

Reports on the blood findings in pulmonary fibrotic conditions due to inorganic dusts, especially silica, have appeared from time to time in medical literature (*56–65*). In a study reported from the Public Health Service in 1936 (*66*), suggestive data of a positive relationship in this regard were reported for erythrocyte sedimentation rate and for differential leukocyte counts. The hematolgic data collected in the present study permitted further extension of these observations.

It was found that, although no correlation with degree of pulmonary fibrosis existed for erythrocyte count, hematocrit value, hemoglobin estimation, mean corpuscular volume, mean corpuscular hemoglobin, and mean corpuscular hemoglobin concentration, significantly positive correlations were found between the degrees of lung changes and the total leukocyte counts as well as the erythrocyte sedimentation rates. As the degree of pulmonary fibrosis increased for the group, the total leukocyte counts were elevated and the corrected erythrocyte sedimentation rates were found to be more rapid. Similar observations have been made by others and have been variously interpreted (*57*, *58*). The present data do not warrant the opinion that the blood changes observed indicate infection superimposed on the pulmonary fibrosis. Rather, it appears that the lung fibrosis may itself be associated with an elevated leukocyte count and an increased erythrocyte sedimentation rate, confirming an opinion expressed in recent publications on this subject (*57*, *58*).

Increased speed of settling of erythrocytes occurs in many disease states and is, therefore, a nonspecific test as is the occurrence of leukocytosis or an elevated temperature. Thus, in general, it is used to call attention to occult diseases or as a means of following the progress of recognized disease states. In the present study, it is quite likely that certain of such disease states were probably present which could have given rise to an acceleration of the sedimentation rate. Nevertheless, there is no reason to suspect that such disease states were more frequent in those with pulmonary fibrosis than they were in those without pulmonary fibrosis. This hypothesis was tested and was found to be the fact. Thus, it is felt that the elevated sedimenta-

tion rate was probably due to the pulmonary fibrosis as it occurred in the study itself.

## Summary of Medical Findings

1. A total of 1,937 ferrous foundrymen from 16 establishments were medically examined to determine what effects the work had upon their health. Data for the environment were available from the engineering studies. The medical examinations included, among other things, routine history and physical examination, examination of the oral structures by dentists, routine 14- x 17-inch chest roentgenograms, routine urine analyses, tests for visual acuity, and a battery of blood studies. Correlations of many of the findings were made with the engineering data.

2. Study of the oral structures reveals that attrition was of greater frequency in this group than in a comparable industrial group who did not have exposure to a dust of the hardness of silica.

3. The condition of the eyes to the extent that they were examined did not reveal any abnormalities which could be attributed to the occupation.

4. In the blood findings the foundrymen had lower erythrocyte and hemoglobin levels than a comparable industrial group; these alterations were probably not due to the occupation.

5. X-ray evidence of active and inactive re-infection type of pulmonary tuberculosis was found in 0.7 percent of white and 1.7 percent of nonwhite workers, rates not remarkably different from those of the general population of the area in which the study was made.

6. Nodular pulmonary fibrosis (silicosis) was found in 1.5 percent of the workers; in 1.3 percent it was stage one; in 0.15 percent, stage two; and in 0.05 percent, stage three. Diffuse pulmonary fibrosis (ground glass two), probably related to the dust of the occupation, was present in 7.7 percent of the study group.

7. Exposure to dust in occupations other than foundry work did not appear to have an influence on the degrees of fibrosis observed or the incidence rates.

8. Pulmonary fibrosis occurred with about equal frequency in steel and gray-iron foundrymen.

9. The part played by iron dust in the forms of metallic iron and the oxides of iron, although it did not appear to be of importance in the roentgenograms observed in this study, cannot be fully evaluated at this time.

10. Among the steel foundrymen, casting cleaning was the most hazardous occupation from the point of view of pulmonary fibrosis; among the gray-iron foundrymen, molders had the highest incidence of pulmonary fibrosis.

11. It generally required more than 14 years of exposure in the industry for the appearance of nodular fibrosis.

12. A positive association was found between progressively increasing degrees of pulmonary fibrosis and erythrocyte sedimentation rate as well as total leukocyte count. These findings were not associated with infection complicating pulmonary fibrosis.

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# Communities Awarded Milk Sanitation Ratings of 90 Percent or More During 1949 and 1950[1]

This is the semiannual revision of the list of Public Health Service Milk Ordinance communities which were reported by State milk sanitation authorities during the 2-year period January 1, 1949 to December 31, 1950, as having a market milk rating of at least 90 percent. The inclusion of a community in this list means that if pasteurized milk is sold in the community it is of such a degree of excellence that the weighted average of the percentages of compliance with the various items of sanitation required by the Public Health Service Milk Ordinance for grade A pasteurized milk is 90 percent or more. Similarly, if raw milk is sold in the community, it must so nearly meet the standards that the weighted average of the percentages of compliance with the various items of sanitation required for grade A raw milk is 90 percent or more.

These ratings are not a complete measure of safety, but represent the degree of compliance with the grade A standards. High-grade

[1] From the Division of Sanitation, Milk and Food Branch, Public Health Service.

pasteurized milk is safer than high-grade raw milk because of the added protection of pasteurization. Safety estimates should take into account the percentage of milk pasteurized (see table). To obtain this added protection, those who are dependent on raw milk can pasteurize the milk at home by the use of an approved home pasteurizer or by either of the following methods: (1) after the water in the bottom of a double boiler has been brought to a vigorous boil, place the inner container with milk in the outer container, cover it, and continue to apply the same heat for 10 minutes; or (2) heat the milk in an open saucepan over a hot flame to 165° F., stirring constantly, then immediately place the vessel in cold water and continue stirring until cool, changing the water when it warms up; however, if a dependable thermometer is not available, bring the milk to a boil instead. Method 1 produces a cooked flavor, while method 2 is not quite as safe as method 1.

The milk ordinance recommended by the Public Health Service is now in effect State-wide in 13 States, as well as in 367 counties and 1,468 municipalities located in 39 States. It has been adopted as a regulation by 34 States and Territories.

The primary reason for publishing the rating lists is to encourage these communities to attain and maintain a high level of excellence in the enforcement of the ordinance. No comparison with communities operating under other milk ordinances is intended or implied. Some communities which have high-grade milk supplies are not included because arrangements have not been made for the determination of their ratings by the State milk sanitation authority. In other cases the ratings which have been submitted are now more than 2 years old and have therefore lapsed. In still other communities with high-grade milk supplies there seems, in the opinion of the community, to be no local necessity nor desire for rating or inclusion in the list.

The rules under which a community is included in this list are as follows:

1. All ratings must be determined by the State milk sanitation authority in accordance with the Public Health Service rating method [2] based upon the grade A pasteurized milk and the grade A raw milk requirements for the Public Health Service Milk Ordinance and Code. A recent departure from the method described consists of computing the pasteurized milk rating by weighting the plant rating twice as much as the rating of the raw milk for pasteurization.

2. No community will be included in the list unless both its pasteurized milk and its raw milk ratings are 90 percent or more. Communities in which only raw milk is sold will be included if the raw milk rating is 90 percent or more.

[2] Pub. Health Rep. 53: 1386 (1938). Reprint No. 1970.

3. The rating used will be the latest rating submitted to the Public Health Service, but no rating will be used which is more than 2 years old. In order to promote continuous rigid enforcement rather than occasional "clean-up campaigns," it is suggested that when the rating of a community on the list falls below 90 percent no resurvey be made for at least 6 months, which will result in removal from the next semi-annual list.

4. No community will hereafter be included on the list whose milk supply is not under an established program of official routine inspection and laboratory control provided by itself, the county, a milk control district, or the State. In the absence of such an official program there can be no assurance that only milk from sources rating 90 percent or more will be used continuously.

5. The Public Health Service will make occasional check surveys of cities for which ratings of 90 percent or more have been reported by the State. If such check rating is less than 90 percent but not less than 85, the city will be removed from the 90 percent list after 6 months unless a resurvey submitted by the State during this probationary interim shows a rating of 90 percent or more. If, however, such check rating is less than 85 percent, the city will be removed from the list immediately. If the check rating is 90 percent or more, the city will be retained on the list for 2 years from the date of the check survey unless a subsequent rating during this period warrants its removal.

Communities now on the list should not permit their ratings to lapse since ratings more than 2 years old cannot be used.

State milk sanitation authorities who are not now equipped to determine municipal ratings are urged, in fairness to their communities, to equip themselves as soon as possible. The personnel required is small; in most States one milk sanitarian is sufficient for this work.

**Communities Awarded Milk Sanitation Ratings of 90 Percent or More, 1949–50**

ALL MARKET MILK PASTEURIZED

| Community | Percent of milk pasteurized | Date of rating | Community | Percent of milk pasteurized | Date of rating |
|---|---|---|---|---|---|
| ALABAMA | | | COLORADO—continued | | |
| Auburn | 100 | Sept. 29, 1949 | Durango | 100 | July —, 1950 |
| Birmingham and Jefferson County* | 100 | Nov. 17, 1949 | Grand Junction | 100 | Mar. 29, 1950 |
| Montgomery | 100 | May 11, 1950 | GEORGIA | | |
| Opelika | 100 | June 15, 1950 | Columbus | 100 | Oct. 27, 1949 |
| ARKANSAS | | | Cordele | 100 | Sept. 8, 1949 |
| Fort Smith | 100 | Dec. 15, 1950 | Quitman | 100 | Aug. 25, 1949 |
| COLORADO | | | West Point | 100 | Mar. 29, 1949 |
| Colorado Springs | 100 | Nov. —, 1949 | IDAHO | | |
| Cortez | 100 | July —, 1950 | Bonners Ferry | 100 | May 14, 1949 |
| | | | Caldwell | 100 | Apr. 14, 1949 |
| | | | Idaho Falls | 100 | Aug. 24, 1949 |
| | | | Sandpoint | 100 | May 14, 1949 |

*Not operating under milk ordinance recommended by the Public Health Service.

## Communities Awarded Milk Sanitation Ratings of 90 Percent or More, 1949–50—Continued

ALL MARKET MILK PASTEURIZED

| Community | Percent of milk pasteurized | Date of rating |
|---|---|---|
| ILLINOIS | | |
| Chicago | 100 | Oct. 28, 1949 |
| Decatur | 100 | Apr. 27, 1950 |
| East Moline | 100 | May 18, 1950 |
| Elgin | 100 | Dec. 8, 1949 |
| Glencoe | 100 | Nov. 7, 1949 |
| Highland Park | 100 | Nov. 7, 1949 |
| Joliet | 100 | July 14, 1950 |
| Kenilworth | 100 | Nov. 7, 1949 |
| Lake Bluff | 100 | Nov. 7, 1949 |
| Lake Forest | 100 | Nov. 7, 1949 |
| Moline | 100 | May 18, 1950 |
| Northfield | 100 | Nov. 7, 1949 |
| Oak Park | 100 | Sept. —, 1949 |
| Peoria | 100 | Apr. 15, 1950 |
| Rock Island | 100 | May 10, 1950 |
| Silvis | 100 | May 18, 1950 |
| Skokie | 100 | Nov. 7, 1949 |
| Waukegan | 100 | Nov. 2, 1949 |
| Winnetka | 100 | Nov. 7, 1949 |
| INDIANA | | |
| Anderson | 100 | Dec. 19, 1949 |
| Bedford-Orleans | 100 | Sept. —, 1950 |
| Berne | 100 | Feb. —, 1950 |
| Bluffton | 100 | Dec. 14, 1950 |
| Calumet | 100 | June —, 1950 |
| Evansville | 100 | Aug. —, 1950 |
| Hope | 100 | Dec. 12, 1949 |
| La Porte | 100 | May —, 1950 |
| Shelbyville | 100 | Oct. —, 1950 |
| South Bend | 100 | Dec. —, 1949 |
| IOWA | | |
| Clinton | 100 | July 12, 1950 |
| KANSAS | | |
| Dodge City | 100 | May 24, 1950 |
| KENTUCKY | | |
| Bowling Green and Warren County | 100 | July 13, 1950 |
| Hopkinsville | 100 | Mar. —, 1950 |
| Mayfield and Graves County | 100 | May 11, 1950 |
| Mount Sterling | 100 | Aug. 16, 1950 |
| Murray | 100 | Apr. 19, 1950 |
| Owensboro | 100 | Nov. 17, 1950 |
| Paducah | 100 | May 5, 1950 |
| MISSOURI | | |
| Cape Girardeau | 100 | Oct. 25, 1950 |
| Columbia | 100 | Dec. 13, 1949 |
| Concordia | 100 | June 7, 1950 |
| Eldon | 100 | Dec. 14, 1950 |
| Jackson | 100 | Oct. 25, 1950 |
| NORTH CAROLINA | | |
| Charlotte | 100 | Feb. 23, 1950 |
| Cumberland County | 100 | Feb. 10, 1950 |
| Mars Hill | 100 | Dec. 9, 1949 |
| Transylvania County | 100 | Jan. 16, 1950 |
| Wilson | 100 | Aug. 2, 1950 |
| OKLAHOMA | | |
| Cushing | 100 | Feb. 10, 1950 |
| SOUTH DAKOTA | | |
| Sioux Falls | 100 | Sept. 21, 1950 |
| TENNESSEE | | |
| Athens | 100 | June 14, 1950 |
| Bristol | 100 | Nov. 4, 1949 |
| Chattanooga | 100 | Oct. 26, 1949 |
| Columbia | 100 | Apr. 20, 1950 |
| Covington | 100 | Aug. 15, 1950 |
| Dyersburg | 100 | Aug. 17, 1950 |
| Erwin | 100 | Feb. 17, 1949 |
| Fayetteville | 100 | May 10, 1949 |
| Franklin | 100 | May 5, 1950 |
| Greenville | 100 | Oct. 7, 1949 |
| Kingsport | 100 | Sept. 23, 1949 |
| Knoxville | 100 | Sept. 23, 1949 |
| Lawrenceburg | 100 | Aug. 21, 1950 |
| Lebanon | 100 | July 19, 1950 |
| Lewisburg | 100 | Apr. 17, 1950 |
| Manchester | 100 | Oct. 5, 1950 |
| Morristown | 100 | Oct. 13, 1949 |
| Nashville and Davidson County | 100 | Apr. 10, 1950 |
| Newbern | 100 | Aug. 16, 1950 |
| Shelbyville | 100 | June 13, 1949 |
| TEXAS | | |
| Bay City | 100 | May 4, 1950 |
| College Station | 100 | Sept. 20, 1950 |
| Galveston | 100 | Apr. 18, 1949 |
| Gladewater | 100 | July 25, 1949 |
| Harlingen | 100 | Mar. 20, 1950 |
| Houston | 100 | June 30, 1950 |
| Jacksonville | 100 | Apr. 12, 1950 |
| Kilgore | 100 | July 25, 1949 |
| Mission | 100 | Apr. 5, 1950 |
| Pharr | 100 | Apr. 5, 1950 |
| San Antonio | 100 | Mar. 11, 1950 |
| San Juan | 100 | Apr. 5, 1950 |
| Sweetwater | 100 | Apr. 19, 1950 |
| Texarkana | 100 | Aug. 5, 1950 |
| Texas City | 100 | Apr. 25, 1949 |
| Tyler | 100 | Mar. 2, 1950 |
| Weslaco | 100 | Apr. 5, 1950 |
| UTAH | | |
| Delta | 100 | Nov. 17, 1950 |
| Ogden | 100 | June 1, 1949 |
| Provo | 100 | Apr. 29, 1949 |
| Salt Lake City | 100 | May 27, 1949 |
| VIRGINIA | | |
| Boydton | 100 | Apr. 4, 1950 |
| Bristol | 100 | Nov. 4, 1949 |
| Lawrenceville | 100 | Apr. 6, 1950 |
| Pulaski | 100 | June —, 1950 |
| Radford | 100 | June —, 1950 |
| Richmond | 100 | May —, 1950 |
| Roanoke | 100 | Sept. 23, 1950 |
| Staunton | 100 | Nov. 3, 1950 |
| Suffolk | 100 | May 24, 1950 |
| Waynesboro | 100 | May 19, 1949 |
| WASHINGTON | | |
| Spokane | 100 | July 21, 1950 |
| Whitman County | 100 | Aug. 16, 1950 |

## Communities Awarded Milk Sanitation Ratings of 90 Percent or More, 1949–50—Continued

BOTH RAW AND PASTEURIZED MARKET MILK

| Community | Percent of milk pasteurized | Date of rating |
|---|---|---|
| ALABAMA | | |
| Lanett | 97.5 | Nov. 9, 1950 |
| GEORGIA | | |
| La Grange | 76.2 | Mar. 29, 1949 |
| Macon | 97.1 | Sept. 13, 1949 |
| Thomaston | 79.7 | May 24, 1950 |
| IDAHO | | |
| Boise | 99.3 | Apr. 30, 1949 |
| Payette | 72 | Apr. 14, 1949 |
| Weiser | 92.1 | Apr. 13, 1949 |
| INDIANA | | |
| Michigan City | 98 | May — 1950 |
| IOWA | | |
| Davenport | 99 | Jan. 27, 1950 |
| KENTUCKY | | |
| Lexington and Fayette County | 96 | June 23, 1950 |
| MISSOURI | | |
| Boonville | 87 | Oct. 12, 1950 |
| Jefferson City | 88.5 | July 20, 1950 |
| Moberly | 92.5 | Oct. 13, 1949 |
| Sedalia | 92.5 | Aug. 17, 1950 |
| Springfield | 99 | Nov. 10, 1950 |
| NORTH CAROLINA | | |
| Alexander County | 73.5 | Mar. 31, 1950 |
| Avery County | 73.5 | July 12, 1949 |
| Buncombe County | 95.4 | June 10, 1949 |
| Cabarrus County | 73.4 | Jan. 20, 1950 |
| Greensboro | 99.7 | July 27, 1950 |
| Henderson County | 86 | Feb. 6, 1950 |
| Macon County | 91.4 | Aug. 10, 1950 |
| NORTH CAROLINA—continued | | |
| Wilkes County | 89.7 | Jan. 25, 1950 |
| OKLAHOMA | | |
| Ada | 84 | June 24, 1949 |
| Holdenville | 89 | Mar. 28, 1950 |
| Lawton | 96 | Feb. 20, 1950 |
| Shawnee | 96 | May 25, 1949 |
| Stillwater | 96 | July 7, 1949 |
| Sulphur | 98 | Sept. 6, 1949 |
| OREGON | | |
| Portland | 99.2 | July 24, 1949 |
| TENNESSEE | | |
| Cleveland | 94.4 | Sept. 7, 1950 |
| Elizabethton | 94 | Aug. 8, 1950 |
| Jackson | 95.8 | Mar. 30, 1950 |
| Johnson City | 96.6 | Aug. 9, 1950 |
| McMinnville | 95.1 | May 25, 1950 |
| Murfreesboro | 98 | July 27, 1949 |
| Pulaski | 91.6 | May 6, 1949 |
| TEXAS | | |
| Brenham | 92 | Apr. 15, 1950 |
| Brownsville | 84.8 | Mar. 20, 1950 |
| Bryan | 98.8 | Sept. 21, 1950 |
| Corsicana | 99.6 | Jan. 31, 1950 |
| Edinburg | 85.9 | Apr. 5, 1950 |
| Fort Worth | 99.95 | Feb. 4, 1950 |
| Laredo | 62 | Aug. 24, 1950 |
| Longview | 99 | July 27, 1949 |
| Lubbock | 99.2 | Nov. 8, 1950 |
| Palestine | 79.8 | Apr. 28, 1949 |
| Paris | 92.4 | Nov. 16, 1950 |
| VIRGINIA | | |
| Emporia | 34 | Apr. 7, 1950 |

NOTE.—In these communities the pasteurized market milk shows a 90 percent or more compliance with the grade A pasteurized milk requirements and the raw market milk shows a 90 percent or more compliance with the grade A raw milk requirements of the Public Health Service Milk Ordinance and Code.

Note particularly the percentage of milk pasteurized in the various communities listed. This percentage is an important factor to consider in estimating the safety of a city's milk supply. All milk should be pasteurized or boiled, either commercially or at home, before it is consumed. See text for home method.

# Incidence of Disease

*No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring*

## UNITED STATES

### Reports From States for Week Ended February 3, 1951

The incidence of measles has increased in recent weeks, the number of cases reported for the current week (11,627 cases) being 18 percent greater than the number for the previous week and 87 percent greater than for the same week last year. Texas reported 1,584 new cases; California, 1,149; and Wisconsin, 1,077 cases during the current week.

### Reports of Epidemics

*Dysentery.* Dr. W. L. Halverson, California, Director of Health, has reported an outbreak of 23 cases of shigella infection in one small area of California. In six families single cases occurred, and in four families there were 2 or more with a total of 17.

*Plague.* The Medical Officer-in-Charge, CDC Activities in San Francisco, has reported that the axillary gland and venous blood from a fatal case of bubonic plague was proved plague-infected. The patient resided in Hobbs, Lea County, N. Mex., as reported in the Communicable Disease Summary for January 13, 1951. He shot and dressed eight rabbits on January 2, became ill on January 6, consulted a physician on January 9, and died the same day. In January 1950, a case of bubonic plague was reported in the same county and a similar history was obtained, namely, that infection followed when a hunter shot and cleaned cottontail rabbits. This patient was treated with streptomycin and sulfadiazine and recovered.

*Influenza.* D. H. Stevens, Commissioner of Health and Welfare, Maine, has reported a severe type of influenza in Jackman Plantation, Maine, a remote, forested area in the west central part of the State near the Canadian (Quebec) border on U. S. Route 201. Investigation by district health officers revealed that between January 15 and 27, 67 cases were reported in a population of 1,000. At Forks Plantation six cases occurred in a population of 100. The cases are reported to have sudden onset, marked prostration, and severe aching. Whole families have been affected, and 25 cases occurred in a convent school. No reports have been received of confirmation of a diagnosis of "epidemic influenza" by means of serologic tests or by isolation of virus.

Dr. R. F. Korns, New York State Health Department, has reported 51 cases of an influenza-like infection among 369 inmates housed in one building of a State institution in Utica from January 16 to the present date. The largest number of cases reported in 1 day was 7. Symptoms consisted of fever, chills, aching, and malaise lasting from 3 to 5 days. Two deaths occurred, one in a woman with cardiovascular disease. Otherwise, the disease has been mild and not explosive in character. There has been no increase in respiratory disease in Utica. Throat washings and blood have been obtained for laboratory examination.

An influenza-like infection has also been reported to have been prevalent in Niagara during late January and early February. The symptoms have been mild and have consisted of fever, sore throat, and asthenia with a duration of 2 to 3 days. There have been no deaths. Laboratory confirmation of the presence of influenza virus has not been reported.

Dr. W. L. Halverson has reported that information from physicians and school authorities in northern California indicates an increase in prevalence of mild upper respiratory infections, etiology undetermined. Symptoms are characterized by sudden onset with high fever, chills, and generalized aches. Many have sore throat, nausea, vomiting, and diarrhea. Materials for virus isolation and serologic study have been obtained.

Excerpts from a report by Dr. C. H. Andrews, World Influenza Center, National Institute for Medical Research, London, are given below:

The epidemic seems to be spreading across much of Europe but remains generally mild. Reports have been received of the isolation of virus A strains in WHO influenza laboratories in France, Finland, Spain, Germany, Turkey, and Israel, in addition to those reported earlier. Wherever reports are available, the strains seem to be of the A-prime type. As already suggested, the facts are consistent with a spread from foci in Scandinavia, Spain, and Ireland. No opinion can be offered as to the origin of outbreaks in Turkey and Israel. In Britain the epidemic has been spreading rather slowly through the rest of the country; deaths are now rising in the Midlands; incidence in London and the South is still relatively low. Reports from some other countries are: Belgium—disease mild except in old people. Germany—epidemic not very extensive; some A virus is prevalent; serological tests suggest that some B virus may be present also but no B viruses have been isolated. North Ireland—deaths from influenzal pneumonia still rising (74 in week ended January 20 in Belfast). Yugoslavia—local outbreaks, probably B; virus isolated and sent to the World Influenza Center.

## Influenza Information Center [1]

The Walter and Eliza Hall Institute of Medical Research at the Royal Melbourne Hospital, Australia, reports the isolation of type A influenza virus from 6 to 12 throat washings obtained from cases of suspected influenza on Ocean Island in the mid-Pacific about the middle of November 1950. It seems likely that the virus is closely related to the A-prime virus isolated from the same area in 1948.

The Strain Study Center reports the isolation at Columbia Presbyterian Medical Center in New York of an A-prime strain in the last part of January.

Dr. M. M. Siegel, of the Virus Diagnostic Laboratory at the Children's Hospital of Philadelphia, isolated an A-prime strain of influenza virus from pooled throat washings obtained from several young adult cases. The onset of these were January 28 and 29. He reports no general increase in the number of influenza cases in the Philadelphia area.

The Division of Preventive Medicine, Office of the Surgeon General of the Army, reports that the Sixth Army Medical Laboratory has demonstrated a diagnostic rise in hemagglutination-inhibition titer to A and A-prime types on one pair of serum secured from a patient in Camp Cook, Calif. Another paired serum test indicates a diagnostic rise in hemagglutination-inhibition titer for type B. This serum was from a case at Mather Air Force Base, Calif.

The National Microbiological Institute of the National Institutes of Health reports the isolation of two strains of influenza A-prime virus. One strain was from a young adult seaman on the ship *Liberte* which left South Hampton, England, January 12 and arrived in New York January 18. The other strain was also from a young adult seaman on the *Queen Mary* which left South Hampton January 13 and arrived in New York January 18. Throat washings were taken on the day of arrival in New York.

The Department of Virus and Rickettsial Diseases of the Army Medical Service Graduate School has reported the isolation of two hemagglutinating agents from an influenza outbreak at Fort Monmouth, N. J., during late January 1951. One of these agents has been identified as A-type influenza in tests with human sera. In tests with highly specific rooster antisera, this virus was shown to resemble the FM 1–50 (Cuppett) and London 1–51 viruses. The second agent has not been examined to date. (A mild febrile disease with body aches and a diffuse inflammation of the nasopharynx has occurred among individuals from whom these laboratory specimens were obtained.)

[1] National Institutes of Health, Bethesda, Md.

## *Comparative Data for Cases of Specified Reportable Diseases: United States*

[Numbers after diseases are International List numbers 1948 revision]

| Disease | Total for week ended— Feb. 3, 1951 | Total for week ended— Feb. 4, 1950 | 5-year median 1946–50 | Seasonal low week | Cumulative total since seasonal low week 1950–51 | Cumulative total since seasonal low week 1949–50 | 5-year median 1945–46 through 1949–50 | Cumulative total for calendar year— 1951 | Cumulative total for calendar year— 1950 | 5-year median 1946–50 |
|---|---|---|---|---|---|---|---|---|---|---|
| Anthrax (062) | 2 | ------ | 1 | (1) | (1) | (1) | (1) | 8 | 2 | 6 |
| Diphtheria (055) | 92 | 180 | 227 | 27th | 3,390 | 5,170 | 7,564 | 483 | 899 | 1,206 |
| Encephalitis, acute infectious (082) | 11 | 5 | 10 | (1) | (1) | (1) | (1) | 46 | 50 | 40 |
| Influenza (480-483) | 2,519 | 2,859 | 2,859 | 30th | 25,274 | 22,330 | 28,320 | 10,732 | 11,746 | 11,746 |
| Measles (085) | 11,627 | 6,230 | 7,997 | 35th | 71,735 | 42,259 | 54,406 | 43,034 | 23,129 | 28,282 |
| Meningitis, meningococcal (057.0) | 117 | 83 | 83 | 37th | 1,497 | 1,348 | 1,348 | 536 | 435 | 435 |
| Pneumonia (490-493) | 1,939 | 2,493 | ------- | (1) | (1) | (1) | (1) | 8,261 | 11,343 | ------- |
| Poliomyelitis, acute (080) | 113 | 106 | 59 | 11th | 32,925 | 42,055 | 25,155 | 706 | 581 | 358 |
| Rocky Mountain spotted fever (104) | 1 | 2 | 1 | (1) | (1) | (1) | (1) | 2 | 6 | 3 |
| Scarlet fever (050) [2] | 2,407 | 1,934 | 2,705 | 32d | 26,150 | 24,539 | 35,688 | 10,459 | 8,100 | 12,393 |
| Smallpox (084) | 1 | 1 | 5 | 35th | 12 | 14 | 37 | 4 | 6 | 16 |
| Tularemia (059) | 19 | 15 | 18 | (1) | (1) | (1) | (1) | 84 | 122 | 122 |
| Typhoid and paratyphoid fever (040, 041) [3] | 36 | 49 | 49 | 11th | 3,123 | 3,591 | 3,609 | 208 | 217 | 208 |
| Whooping cough (056) | 1,623 | 2,570 | 2,289 | 39th | 30,106 | 33,005 | 35,251 | 8,504 | 11,469 | 11,469 |

[1] Not computed.
[2] Including cases reported as streptococcal sore throat.
[3] Including cases reported as salmonellosis.

## Reported Cases of Selected Communicable Diseases: United States, Week Ended Feb. 3, 1951

[Numbers under diseases are International List numbers, 1948 revision]

| Area | Diphtheria (055) | Encephalitis, infectious (082) | Influenza (480–483) | Measles (085) | Meningitis, meningococcal (057.0) | Pneumonia (490–493) | Poliomyelitis (080) |
|---|---|---|---|---|---|---|---|
| **United States** | **92** | **11** | **2,519** | **11,627** | **117** | **1,939** | **113** |
| **New England** | **3** | **3** | **28** | **653** | **11** | **83** | **3** |
| Maine | - | - | 21 | 6 | 2 | 25 | - |
| New Hampshire | - | - | 3 | 1 | 1 | 3 | - |
| Vermont | - | - | - | 313 | 1 | - | - |
| Massachusetts | 2 | 3 | - | 283 | 6 | - | 3 |
| Rhode Island | - | - | 1 | 14 | 1 | 1 | - |
| Connecticut | 1 | - | 3 | 36 | - | 54 | - |
| **Middle Atlantic** | **15** | **2** | **13** | **1,687** | **21** | **200** | **6** |
| New York | 9 | - | [1] 3 | 376 | 8 | 89 | 3 |
| New Jersey | 3 | 2 | 10 | 352 | 9 | 60 | 2 |
| Pennsylvania | 3 | - | - | 959 | 4 | 51 | 1 |
| **East North Central** | **1** | **2** | **51** | **2,657** | **26** | **129** | **11** |
| Ohio | 1 | - | 4 | 652 | 12 | - | - |
| Indiana | - | - | 38 | 71 | 1 | 9 | - |
| Illinois | - | 1 | 7 | 457 | 6 | 102 | 1 |
| Michigan | - | 1 | 2 | 400 | 5 | 18 | 10 |
| Wisconsin | - | - | - | 1,077 | 2 | - | - |
| **West North Central** | **3** | - | **21** | **547** | **4** | **138** | **3** |
| Minnesota | - | - | 1 | 80 | 3 | 2 | 1 |
| Iowa | - | - | - | 8 | 1 | - | - |
| Missouri | 1 | - | 1 | 176 | - | - | - |
| North Dakota | - | - | 18 | 18 | - | 116 | - |
| South Dakota | 1 | - | - | 15 | - | - | - |
| Nebraska | 1 | - | - | - | - | - | 2 |
| Kansas | - | - | 1 | 250 | - | 20 | - |
| **South Atlantic** | **26** | - | **1,144** | **822** | **23** | **409** | **18** |
| Delaware | - | - | - | 22 | - | - | - |
| Maryland | - | - | 4 | 24 | 4 | 29 | - |
| District of Columbia | - | - | 5 | 58 | 1 | 17 | 1 |
| Virginia | 7 | - | 780 | 218 | 4 | 102 | 2 |
| West Virginia | 1 | - | 227 | 33 | 3 | 18 | 5 |
| North Carolina | 4 | - | - | 111 | 4 | - | 5 |
| South Carolina | 4 | - | 35 | 10 | 2 | 22 | 1 |
| Georgia | 7 | - | 93 | 304 | 4 | 221 | - |
| Florida | 3 | - | - | 42 | 1 | - | 4 |
| **East South Central** | **10** | - | **70** | **292** | **9** | **61** | **6** |
| Kentucky | - | - | 6 | 138 | 4 | 27 | 2 |
| Tennessee | 5 | - | 58 | 46 | 2 | - | 1 |
| Alabama | 1 | - | - | 17 | 2 | - | 1 |
| Mississippi | 4 | - | 6 | 91 | 1 | 34 | 2 |
| **West South Central** | **20** | **3** | **600** | **1,915** | **11** | **708** | **8** |
| Arkansas | 2 | - | 411 | 109 | 3 | 66 | - |
| Louisiana | 2 | - | 3 | 69 | 1 | 53 | - |
| Oklahoma | 4 | 1 | 186 | 153 | 4 | 49 | 2 |
| Texas | 12 | 2 | - | 1,584 | 3 | 540 | 6 |
| **Mountain** | **1** | **1** | **515** | **1,274** | **2** | **118** | **5** |
| Montana | - | - | 28 | 19 | 1 | - | - |
| Idaho | - | - | - | 46 | - | - | - |
| Wyoming | - | - | - | 72 | - | - | - |
| Colorado | 1 | - | 82 | 800 | 1 | 31 | 4 |
| New Mexico | - | - | - | 60 | - | 15 | - |
| Arizona | - | 1 | 405 | 213 | - | 67 | 1 |
| Utah | - | - | - | 64 | - | - | - |
| Nevada | - | - | - | - | - | - | - |
| **Pacific** | **13** | - | **77** | **1,780** | **10** | **98** | **53** |
| Washington | 1 | - | 15 | 597 | - | 1 | 5 |
| Oregon | 1 | - | 34 | 34 | 3 | 34 | 3 |
| California | 11 | - | 28 | 1,149 | 7 | 63 | 45 |
| Alaska | - | - | - | - | - | 2 | 3 |
| Hawaii | - | - | 7 | - | - | - | - |

[1] New York City only.

*Anthrax:* Pennsylvania, 2 cases. *Leprosy:* District of Columbia, 1 case. *Psittacosis:* California, 1 case.

## Reported Cases of Selected Communicable Diseases: United States, Week Ended Feb. 3, 1951—Continued

[Numbers under diseases are International List numbers, 1948 revision]

| Area | Rocky Mountain spotted fever (104) | Scarlet fever (050) | Smallpox (084) | Tularemia (059) | Typhoid and paratyphoid fever [1] (040,041) | Whooping cough (056) | Rabies in animals |
|---|---|---|---|---|---|---|---|
| **United States** | 1 | 2,407 | 1 | 19 | 36 | 1,623 | 142 |
| **New England** | | 247 | | | 6 | 210 | |
| Maine | | 28 | | | 2 | 46 | |
| New Hampshire | | 16 | | | | 9 | |
| Vermont | | 3 | | | | 41 | |
| Massachusetts | | 163 | | | 4 | 77 | |
| Rhode Island | | 7 | | | | 23 | |
| Connecticut | | 30 | | | | 14 | |
| **Middle Atlantic** | 1 | 343 | | | 8 | 229 | 17 |
| New York | | [3] 201 | | | 4 | 76 | 16 |
| New Jersey | 1 | 45 | | | | 76 | |
| Pennsylvania | | 97 | | | 4 | 77 | 1 |
| **East North Central** | | 614 | | 5 | 1 | 211 | 34 |
| Ohio | | 163 | | | 1 | 30 | 7 |
| Indiana | | 64 | | | | 19 | [3] 20 |
| Illinois | | 97 | | 5 | | 15 | 1 |
| Michigan | | 239 | | | | 79 | 6 |
| Wisconsin | | 51 | | | | 68 | |
| **West North Central** | | 111 | 1 | 2 | 1 | 79 | 18 |
| Minnesota | | 29 | | | | 10 | |
| Iowa | | 18 | | | | 14 | 16 |
| Missouri | | 17 | 1 | 2 | | 9 | |
| North Dakota | | | | | 1 | 4 | |
| South Dakota | | 3 | | | | 2 | |
| Nebraska | | 8 | | | | 2 | |
| Kansas | | 36 | | | | 38 | 2 |
| **South Atlantic** | | 238 | | 5 | 5 | 237 | 27 |
| Delaware | | 2 | | | | | |
| Maryland | | 43 | | | | 16 | |
| District of Columbia | | 9 | | | | 4 | |
| Virginia | | 38 | | 2 | | 28 | |
| West Virginia | | 7 | | | 2 | 28 | 3 |
| North Carolina | | 81 | | | | 90 | |
| South Carolina | | 8 | | | 1 | 3 | 18 |
| Georgia | | 29 | | 3 | 2 | 39 | 6 |
| Florida | | [3] 21 | | | | 29 | |
| **East South Central** | | 98 | | 2 | 2 | 49 | 17 |
| Kentucky | | 44 | | | | 18 | 8 |
| Tennessee | | 33 | | 1 | 1 | 5 | 6 |
| Alabama | | 15 | | | 1 | 13 | 3 |
| Mississippi | | 6 | | 1 | | 13 | |
| **West South Central** | | 64 | | 4 | 3 | 381 | 29 |
| Arkansas | | 2 | | | 1 | 29 | 1 |
| Louisiana | | 12 | | | | 6 | |
| Oklahoma | | 3 | | 1 | | 45 | 1 |
| Texas | | 47 | | 3 | 2 | 301 | 27 |
| **Mountain** | | 228 | | 1 | 3 | 144 | |
| Montana | | 25 | | | | 16 | |
| Idaho | | 42 | | | | 4 | |
| Wyoming | | | | 1 | | 1 | |
| Colorado | | 19 | | | 2 | 12 | |
| New Mexico | | 2 | | | 1 | 44 | |
| Arizona | | 18 | | | | 66 | |
| Utah | | [3] 122 | | | | 1 | |
| Nevada | | | | | | | |
| **Pacific** | | 464 | | | 7 | 83 | |
| Washington | | 111 | | | | 20 | |
| Oregon | | 60 | | | 1 | 22 | |
| California | | [3] 293 | | | 6 | 41 | |
| Alaska | | | | | | | |
| Hawaii | | 3 | | | | | |

[1] Including cases reported as salmonellosis
[2] Report for 2 weeks.
[3] Including cases reported as streptococcal sore throat.

# FOREIGN REPORTS

## CANADA

*Reported Cases of Certain Diseases—Week Ended Jan. 13, 1951*

| Disease | Total | Newfoundland | Prince Edward Island | Nova Scotia | New Brunswick | Quebec | Ontario | Manitoba | Saskatchewan | Alberta | British Columbia |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Brucellosis | 4 | | | | | | 4 | | | | |
| Chickenpox | 1,597 | 1 | | 66 | 3 | 218 | 719 | 55 | 47 | 243 | 245 |
| Diphtheria | 9 | | | | | 5 | 2 | | 1 | | 1 |
| Dysentery, bacillary | 9 | | | | | | 4 | | | | 5 |
| Encephalitis, infectious | 1 | | | | | 1 | | | | | |
| German measles | 337 | | | 16 | | 28 | 154 | | 3 | 21 | 115 |
| Influenza | 51 | | | 39 | | | 12 | | | | |
| Measles | 2,041 | 11 | | 14 | | 317 | 1,520 | 76 | 26 | 16 | 61 |
| Meningitis, meningococcal | 6 | | | | | 1 | 3 | | | 2 | |
| Mumps | 1,929 | 14 | | 22 | 1 | 184 | 604 | 76 | 79 | 459 | 490 |
| Poliomyelitis | 4 | | | | | | | | 2 | 2 | |
| Scarlet fever | 405 | 2 | | 1 | 1 | 107 | 49 | 13 | 11 | 142 | 79 |
| Tuberculosis (all forms) | 180 | 3 | | 1 | 13 | 37 | 39 | 29 | 10 | 3 | 45 |
| Typhoid and paratyphoid fever | 2 | | | | | 1 | | | | 1 | |
| Venereal diseases: | | | | | | | | | | | |
| Gonorrhea | 322 | 6 | | 9 | 2 | 96 | 56 | 27 | 16 | 51 | 59 |
| Syphilis | 77 | 4 | | 6 | 1 | 24 | 23 | 5 | 8 | | 6 |
| Primary | 6 | | | | | | 4 | | 2 | | |
| Secondary | 3 | | | 1 | | 1 | 1 | | | | |
| Other | 68 | 4 | | 5 | 1 | 23 | 18 | 5 | 6 | | 6 |
| Whooping cough | 262 | 2 | | 3 | 7 | 55 | 130 | 20 | 2 | 7 | 36 |

## WORLD DISTRIBUTION OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER

**The following tables are not complete or final for the list of countries included or for the figures given. Since many of the figures are from weekly reports, the accumulated totals are for approximate dates.**

### CHOLERA

(Cases)

| Place | January-November 1950 | December 1950 | January 1951—week ended— | | | |
|---|---|---|---|---|---|---|
| | | | 6 | 13 | 20 | 27 |
| ASIA | | | | | | |
| Burma | 1,201 | 910 | [1] 9 | [1] 32 | [1] 26 | [1] 8 |
| Akyab | 2 | | | 3 | 4 | |
| Bassein | 3 | 13 | 8 | 29 | 21 | 6 |
| Kyaukpyu | 2 | | | | | |
| Maubin | 3 | | | | | |
| Moulmein | 1 | | | | | |
| Pegu | 1 | | | | | |
| Rangoon | [2] 7 | | 1 | | 1 | 2 |
| Toungoo | 8 | | | | | |
| India | 156,797 | 10,039 | [1] 124 | [1] 80 | [1] 114 | [1] 106 |
| Ahmedabad | 10 | | | | | |
| Allahabad | 3 | | | | | |
| Bombay | [2] 430 | [3] 1 | | | | |
| Calcutta | 9,335 | 187 | 52 | 41 | 76 | 60 |
| Cawnpore | 1 | | | | | |

| Place | January-November 1950 | December 1950 | January 1951—week ended— 6 | 13 | 20 | 27 |
|---|---|---|---|---|---|---|
| ASIA—continued | | | | | | |
| India—Continued | | | | | | |
| Cocanada | 2 | | | | | |
| Cuddalore | 59 | 1 | | | | 1 |
| Lucknow | 12 | | | | | |
| Madras | [2] 1,029 | 107 | 12 | 6 | 6 | 17 |
| Masulipatam | 47 | | | | | |
| Nagpur | 71 | [3] 19 | 41 | 11 | 3 | |
| Negapatam | [2] 117 | 28 | 7 | 10 | 15 | 12 |
| New Delhi | 125 | | | | | |
| Port Blair (Andaman Islands) | [3] 2 | | | | | |
| Tellicherry | 27 | | | | | |
| Tiruchirappali | 24 | 26 | 7 | 10 | 10 | 11 |
| Trichinopoly | 1 | | | | | |
| Tuticorin | 26 | 42 | 5 | 2 | 4 | 5 |
| India (French): | | | | | | |
| Karikal | 441 | 64 | 1 | | | |
| Pondicherry | 776 | 38 | 9 | | | |
| India (Portuguese) | 17 | | | | | |
| Indochina: | | | | | | |
| Cambodia | 15 | | | | | |
| Viet Nam | 15 | | 1 | | | |
| Giadinh | 3 | | | | | |
| Rachgia | 1 | | | | | |
| Saigon | 1 | | | | | |
| Pakistan | 26,214 | 2,941 | | [1] 4 | | |
| Chittagong | 186 | 1 | | | | |
| Dacca | 191 | 6 | | 4 | | |

[1] Preliminary. [2] Includes imported cases. [3] Imported.

## PLAGUE

(Cases)

| Place | January-November 1950 | December 1950 | 6 | 13 | 20 | 27 |
|---|---|---|---|---|---|---|
| AFRICA | | | | | | |
| Belgian Congo | 31 | | | | | |
| Costermansville Province | 15 | | | | | |
| Stanleyville Province | 16 | | | | | |
| Madagascar | 105 | 49 | | [1] 16 | | |
| Rhodesia, Northern | 2 | | | | | |
| Union of South Africa | 17 | | | | | |
| Cape Province | 3 | | | | | |
| Orange Free State | 11 | | | | | |
| Transvaal Province | 1 | | | | | |
| Johannesburg | 1 | | | | | |
| ASIA | | | | | | |
| Burma | 281 | 40 | | | | |
| Bassein | 1 | | | | | |
| Bhamo | [2] 4 | | | | | |
| Henzada | 15 | | | | | |
| Kyaiklat | 34 | | | | | |
| Minhla | 2 | | | | | |
| Moulmein | [2] 3 | | | | | |
| Myaungmya | 5 | | | | | |
| Myingyan | 2 | | | | | |
| Pegu | [3] 5 | | | | | |
| Prome | [3] 1 | | | | | |
| Pyapon | 3 | | | | | |
| Rangoon | [2] 8 | | | | | |
| Yenangyaung | 58 | | | | | |
| China: | | | | | | |
| Chekiang Province | 42 | | | | | |
| Wenchow | [4] 4 | | | | | |
| Fukien Province | 988 | | | | | |
| Amoy | 10 | | | | | |
| Kwangsi Province | [4] 63 | | | | | |
| Kwangtung Province | 627 | | | | | |
| India | 41,540 | 920 | | [3, 5] 2 | [3, 5] 2 | |
| Allahabad | [3] 19 | [3] 1 | | [3] 2 | [3] 2 | |
| Bombay | [2] 5 | | | | | |
| Calcutta | [2] 3 | | | | | |
| Cawnpore | 18 | | | | | |
| Lucknow | [2] 10 | | | | | |
| Indochina: | | | | | | |
| Cambodia | [6] 46 | | | | | |
| Pnompenh | 3 | | | | | |

## PLAGUE—Continued

| Place | January-November 1950 | December 1950 | January 1951—week ended— | | | |
|---|---|---|---|---|---|---|
| | | | 6 | 13 | 20 | 27 |
| ASIA—continued | | | | | | |
| Indochina—Continued | | | | | | |
| Viet Nam | 132 | 3 | 2 | 4 | 4 | - |
| **Phanthiet** | 94 | 2 | - | 1 | 4 | - |
| **Saigon** | 1 | - | - | - | - | - |
| Laos | 2 | - | - | - | - | - |
| Indonesia: | | | | | | |
| Java | 423 | 5 | - | [3] [5] 1 | - | - |
| **Bandoeng** | 6 | - | - | - | - | - |
| **Djakarta** | 3 | - | - | [3] 1 | - | - |
| **Jogjakarta** | 234 | 5 | | | | |
| Pakistan | [3] 1 | - | - | - | - | - |
| **Karachi** | [3] 1 | - | - | - | - | - |
| Thailand | 56 | 2 | - | - | - | - |
| SOUTH AMERICA | | | | | | |
| Brazil | 50 | - | - | - | - | - |
| Alagoas State | 17 | - | - | - | - | - |
| Bahia State | 15 | - | - | - | - | - |
| Ceara State | 2 | - | - | - | - | - |
| Paraiba State | 5 | - | - | - | - | - |
| Pernambuco State | 10 | - | - | - | - | - |
| Sao Paulo State: **Santos** | 1 | - | - | - | - | - |
| Ecuador | 27 | - | - | - | - | - |
| Chimborazo Province | 4 | - | - | - | - | - |
| El Oro Province | 4 | - | - | - | - | - |
| Loja Province | 19 | - | - | - | - | - |
| Peru | 28 | - | - | - | - | - |
| Ancash Department | 3 | - | - | - | - | - |
| Lambayeque Department | 2 | - | - | - | - | - |
| Libertad Department | 1 | - | - | - | - | - |
| Lima | 11 | - | - | - | - | - |
| Piura Department | 11 | - | - | - | - | - |
| Venezuela | 5 | - | - | - | - | - |
| Miranda State | 5 | - | - | - | - | - |

[1] Jan. 1-10, 1951. [2] Includes imported cases. [3] Imported. [4] Deaths. [5] Preliminary figure. [6] Includes suspected cases.

## SMALLPOX

| Place | January-November 1950 | December 1950 | January 1951—week ended— | | | |
|---|---|---|---|---|---|---|
| | | | 6 | 13 | 20 | 27 |
| AFRICA | | | | | | |
| Algeria | 139 | 7 | - | - | - | - |
| Angola | 270 | - | - | - | - | - |
| Bechuanaland | 204 | - | - | - | - | - |
| Belgian Congo | 4, 537 | 423 | 64 | 47 | - | - |
| British East Africa: | | | | | | |
| Kenya | 12 | - | - | - | - | - |
| Nyasaland | 282 | 7 | - | 3 | - | - |
| Tanganyika | 4, 581 | 120 | [1] 1 | - | - | - |
| Uganda | 4 | 2 | - | - | - | - |
| Cameroon (British) | 438 | 4 | - | - | - | - |
| Cameroon (French) | 133 | 1 | - | - | - | - |
| Dahomey | 417 | 120 | - | [2] 45 | [3] 67 | - |
| Egypt | [4] 6 | 3 | - | - | - | - |
| Eritrea | 1 | - | - | - | - | - |
| Ethiopia | 36 | - | - | - | - | - |
| French Equatorial Africa | 454 | 5 | - | - | - | - |
| French Guinea | 12 | - | - | - | - | - |
| French West Africa: Haute Volta | 230 | 14 | - | 1 | - | - |
| Gambia | 6 | - | - | - | - | - |
| Gold Coast | 366 | 76 | 28 | 40 | - | - |
| Ivory Coast | 664 | 35 | - | [2] 27 | [3] 9 | - |
| Libya | 2 | - | - | - | - | - |
| Mauritania | 1 | - | - | - | - | - |
| Morocco (French) | 15 | 3 | - | [2] 4 | - | - |
| Mozambique | 353 | 17 | - | - | - | - |
| Nigeria | 18, 526 | 440 | - | - | - | - |
| Niger Territory | 1, 219 | 53 | - | [2] 21 | - | - |
| Rhodesia: | | | | | | |
| Northern | 5 | - | - | - | - | - |
| Southern | 703 | - | - | - | - | - |
| Senegal | 2 | - | - | - | - | - |

| Place | January-November 1950 | December 1950 | January 1951—week ended— 6 | 13 | 20 | 27 |
|---|---|---|---|---|---|---|
| AFRICA—continued | | | | | | |
| Sierra Leone | 33 | | | | | |
| Sudan (Anglo-Egyptian) | 80 | 3 | 1 | 8 | | |
| Sudan (French) | 301 | 27 | | [2] 33 | | |
| Togo (French) | 121 | 6 | | [3] 12 | | |
| Tunisia | 1 | | | | | |
| Union of South Africa | 914 | | | | | |
| ASIA | | | | | | |
| Afghanistan | 530 | | | | | |
| Arabia | 336 | | | | | |
| Bahrein Islands: Bahrein | 36 | | | | | |
| Kamaran Island: Kamaran | [1] 2 | | | | | |
| Burma | 5,058 | 39 | [4] 2 | [4] 2 | [4] 2 | [4] 8 |
| Ceylon | [5] 3 | | | | | |
| China | 785 | 3 | | | | |
| India | 134,892 | 7,241 | 705 | 583 | 722 | 558 |
| India (French) | 592 | 195 | 42 | | | |
| India (Portuguese) | 102 | | | | | |
| Indochina: | | | | | | |
| Cambodia | 89 | 10 | | | | |
| Viet Nam | 250 | 19 | | 2 | | 2 |
| Indonesia: | | | | | | |
| Borneo | 1,342 | 10 | | | | |
| Java | 7,695 | 79 | 10 | 22 | 2 | |
| Sumatra | 346 | | | | | |
| Iran | 376 | 68 | 18 | 8 | | 4 |
| Iraq | 220 | 52 | 13 | 10 | 31 | 122 |
| Israel | 16 | 1 | | | | |
| Japan | 6 | | | | | |
| Korea (Republic of) | 1,331 | | | | | |
| Lebanon | [5] 2 | | | | | |
| Netherlands New Guinea | 3 | | | | | |
| Pakistan | 17,703 | 2,943 | [4] 3 | [4] 4 | [4] 2 | [4] 3 |
| Palestine | 95 | | | | | |
| Straits Settlements: | | | | | | |
| Singapore | [5] 2 | | | | | |
| Syria | 15 | 1 | | | | |
| Thailand | 460 | | | | | |
| Transjordan | 35 | | | | | |
| Turkey. (*See* Turkey in Europe.) | | | | | | |
| EUROPE | | | | | | |
| Great Britain: | | | | | | |
| England: | | | | | | |
| Brighton | | 15 | | 14 | 1 | |
| Liverpool | 1 | | | | | |
| Scotland: Glasgow | 21 | | | | | |
| Greece | 15 | | | | | |
| Portugal | 1 | | | | | |
| Sicily | 2 | | | | | |
| Spain: Canary Islands | 1 | | | | | |
| Turkey | 9 | | | | | |
| NORTH AMERICA | | | | | | |
| Guatemala | 9 | | | | | |
| Mexico | 506 | | | | | |
| SOUTH AMERICA | | | | | | |
| Argentina | 517 | | | | | |
| Brazil | 111 | | | | | |
| Chile | 3,588 | | | | | |
| Colombia | 602 | | | | | |
| Ecuador | 237 | | | | | |
| Paraguay | 4 | | | | | |
| Peru | 2,680 | | | | | |
| Venezuela | 1,538 | | | | | |
| OCEANIA | | | | | | |
| Australia: Freemantle | [1] 1 | | | | | |

[1] Imported. [2] Jan. 1-10, 1951. [3] Jan. 11-20, 1951. [4] Preliminary figure. [5] Includes imported cases

## TYPHUS FEVER [4]

| Place | January-November 1950 | December 1950 | January 1951—week ended— | | | |
|---|---|---|---|---|---|---|
| | | | 6 | 13 | 20 | 27 |
| **AFRICA** | | | | | | |
| Algeria | 116 | 11 | | | | |
| Basutoland | 24 | | | | | |
| Belgian Congo | [1] 90 | | | | | |
| British East Africa: | | | | | | |
| Kenya | 23 | | | | | |
| Mombasa | [2] 3 | | | | | |
| Uganda | 2 | | | | | |
| Egypt | 93 | 3 | | | | |
| Eritrea | 35 | 2 | | 1 | | |
| Ethiopia | 1,046 | | | | | |
| French Equatorial Africa | 5 | | | | | |
| Gold Coast | 10 | | | | | |
| Libya: | | | | | | |
| Cyrenaica | 27 | | | | | |
| Tripolitania | 73 | | 1 | | | |
| Madagascar | 2 | | | | | |
| Morocco (French) | 10 | | | | | |
| Morocco (International Zone) | 2 | | | | | |
| Morocco (Spanish Zone) | 6 | | | | | |
| Mozambique | 3 | | | | | |
| Nigeria | 1 | | | | | |
| Rhodesia, Southern | [1] 7 | | | | | |
| Sierra Leone | [2] 5 | | | | | |
| Sudan (Anglo-Egyptian) | 5 | | | | | |
| Tunisia | 59 | | | | | |
| Union of South Africa | 98 | | | | | |
| **ASIA** | | | | | | |
| Afghanistan | 1,308 | | | | | |
| Burma | [1] 15 | | | | | |
| Ceylon | 2 | | | | | |
| China | [1] 20 | | | | | |
| India | 327 | 36 | 6 | 1 | | |
| India (Portugense) | 84 | 6 | | | | |
| Indochina: Viet Nam | 34 | 1 | | 2 | | |
| Indonesia: | | | | | | |
| Java | 6 | | | | | |
| Sumatra | 1 | | | | | |
| Iran | [1] 211 | 9 | | 2 | | 1 |
| Iraq | 132 | 5 | | 1 | 1 | |
| Japan | [1] 928 | 2 | | | | |
| Korea (Republic of) | [2] 1,161 | | | | | |
| Lebanon | [1] 2 | | | | | |
| Netherlands New Guinea | 2 | | | | | |
| Pakistan | 102 | 1 | | | | |
| Palestine | 7 | | | | | |
| Straits Settlements: Singapore | [1] 8 | | | | | |
| Syria | [1] 39 | | | | | |
| Transjordan | 28 | | | | | |
| Turkey (see Turkey in Europe): | | | | | | |
| **EUROPE** | | | | | | |
| France | 1 | | | | | |
| Germany (British Zone) | [1] 2 | | | | | |
| Germany (French Zone) | 2 | | | | | |
| Germany (United States Zone) | 3 | | | | | |
| Great Britain: | | | | | | |
| England: Liverpool | [2,3] 1 | | | | | |
| Island of Malta [1] | 40 | | | | | |
| Greece | 28 | | | | | |
| Hungary | 4 | | | | | |
| Italy | 53 | | | | | |
| Sicily | 41 | | | | | |
| Poland | 37 | | | | | |
| Portugal | 5 | | | | | |
| Spain | 47 | | | | | |
| Turkey | 193 | 34 | 7 | 5 | 4 | 3 |
| Yugoslavia | 264 | | | | | |
| **NORTH AMERICA** | | | | | | |
| Costa Rica [1] | 17 | | | | | |
| Guatemala | 33 | | | | | |
| Jamaica [1] | 31 | 3 | 1 | | | |
| Mexico [1] | 361 | 1 | | | | |
| Panama Canal Zone [1] | 6 | | | | | |
| Puerto Rico [1] | 21 | 3 | | | | |
| Virgin Islands | 1 | | | | | |

## TYPHUS FEVER—Continued

| Place | January-November 1950 | December 1950 | January 1951—week ended— | | | |
|---|---|---|---|---|---|---|
| | | | 6 | 13 | 20 | 27 |
| **SOUTH AMERICA** | | | | | | |
| Argentina | 2 | | | | | |
| Chile | 134 | 9 | | | | |
| Colombia | 515 | | | | | |
| Curacao | 3 | | | | | |
| Ecuador | 348 | | | | | |
| Peru | 1,089 | | | | | |
| Venezuela | 133 | | | | | |
| **OCEANIA** | | | | | | |
| Australia [1] | 104 | | | | | |
| Hawaii Territory [1] | 8 | | | | | |

Reports from some areas are probably murine type, while others include both murine and louse-borne )es.
Includes murine type. [2] Murine. [3] Imported.

## YELLOW FEVER

(C—cases; D—deaths)

| Place | | January-November 1950 | December 1950 | 6 | 13 | 20 | 27 |
|---|---|---|---|---|---|---|---|
| **AFRICA** | | | | | | | |
| Belgian Congo | C | 1 | 1 | | | | |
| Stanleyville Province | C | 1 | 1 | | | | |
| French Equatorial Africa | C | [1] 1 | | | | | |
| Port Gentil | C | [1] 1 | | | | | |
| Gold Coast | C | 18 | | | [1] 1 | | |
| Accra | D | [2] 4 | | | | | |
| Ankobra Ferry | D | 1 | | | | | |
| Bogoso | C | [2] 2 | | | | | |
| Kade | C | 1 | | | | | |
| Oda Area: | | | | | | | |
| Akwatia | C | [2] 8 | | | | | |
| Atiankama | C | 1 | | | | | |
| Bawdua | D | 1 | | | [1] 1 | | |
| Taquah-Aboso | D | [2] 1 | | | | | |
| Nigeria | D | [2] 1 | | | | | |
| Calabar | D | [2] 1 | | | | | |
| Ibadan | D | [1] 1 | | | | | |
| Sierra Leone | C | [2] 2 | | | | | |
| Koinadugu District | C | [2] 2 | | | | | |
| **NORTH AMERICA** | | | | | | | |
| Panama: | | | | | | | |
| Colon | D | 1 | | | | | |
| **SOUTH AMERICA** | | | | | | | |
| Bolivia | C | 867 | | | | | |
| Chuquisaca Department | C | [4] 850 | | | | | |
| La Paz Department | C | [5] 17 | | | | | |
| Brazil | D | 2 | 20 | | 20 | | |
| Bahia State | D | 1 | | | | | |
| Ipiau | D | 1 | | | | | |
| Goiaz State | D | | [6] 20 | | [6] 20 | | |
| Uruacu | D | | [6] 20 | | | | |
| Maranhao State | D | 1 | | | | | |
| Colinas | D | 1 | | | | | |
| Colombia | D | 8 | 2 | | | | 5 |
| Boyaca Department | D | 1 | | | | | |
| Chizu | D | 1 | | | | | |
| Magdalena Department | D | 1 | | | | | |
| Los Angeles, Rio de Oro | D | 1 | | | | | |
| Meta Territory | D | | 2 | | | | |
| Puerto Lopez | D | | 2 | | | | |
| North Santander Department | D | 1 | | | | | 2 |
| La Vega | D | | | | | | 2 |
| Ocana | D | 1 | | | | | |
| Putumayo Commissary | D | 3 | | | | | |
| Mocoa Locality | D | 3 | | | | | |
| Santander Department | D | 2 | | | | | 3 |
| Campohermoso | D | | | | | | 1 |
| Cuesta Rica | D | 1 | | | | | |
| Landazuri | D | 1 | | | | | |
| Maradales | D | | | | | | 1 |
| Veneoas | D | | | | | | 1 |

| Place | January-November 1950 | December 1950 | January 1951—week ended— 6 | 13 | 20 | 27 |
|---|---|---|---|---|---|---|
| SOUTH AMERICA—continued | | | | | | |
| Peru — D | 14 | | | | | |
| Cuzco Department — D | 2 | | | | | |
| Quincemil — D | 2 | | | | | |
| Huanuco Department — D | 6 | | | | | |
| Tingo Maria — D | 6 | | | | | |
| Junin Department — D | 1 | | | | | |
| San Ramon — D | 1 | | | | | |
| Loredo Department — D | 1 | | | | | |
| Pucalpa — D | 1 | | | | | |
| San Martin Department — D | 4 | | | | | |
| Bellavista — D | 1 | | | | | |
| Juanjui — D | 1 | | | | | |
| Lamas — D | 1 | | | | | |
| Tarapoto — D | 1 | | | | | |
| Venezuela — D | 3 | | | | | |
| Bolivar State — D | 2 | | | | | |
| Argelia — D | 1 | | | | | |
| La Parida — D | 1 | | | | | |
| Tachira State — D | 1 | | | | | |
| El Milagro — D | 1 | | | | | |

[1] Suspected. [2] Includes suspected cases. [3] Imported. [4] Estimated number of cases reported in an outbreak in Asero Province, Jan. 1–Mar. 14, 1950. [5] Outbreak in North and South Youngas Provinces. [6] Estimated deaths. The number of cases from Dec. 1 to Jan. 20 was estimated to be 200.

## Examination for Chemists and Biochemists

Competitive examinations for the appointment of chemists and biochemists to the Regular Commissioned Corps of the Public Health Service will be held in various cities throughout the country on April 16, 17, and 18, 1951. The examination will include professional written tests, an oral interview, and a physical examination. Completed applications must be in the Washington office by March 19, 1951.

Appointments are permanent and provide opportunities for career service in research and public health activities. Appointments will be made in the grades of assistant and senior assistant, equivalent to Navy ranks of lieutenant (j. g.) and lieutenant, respectively. Entrance pay is $4,486 for assistants with dependents, and $5,346 for senior assistants, including rental and subsistence allowance. Applicants must expect to receive the master's or doctor's degree no later than January 16, 1952, and by that time must have completed a total of 7 years of training and professional experience subsequent to high school.

For application forms and additional information write to: Surgeon General, Public Health Service, Federal Security Agency, Washington 25, D. C., Attention: Division of Commissioned Officers.

## Symposium on Venereal Diseases

The Fourth Annual Symposium on Recent Advances in the Study of Venereal Diseases will be held in Washington, D. C., on April 24 and 25. This meeting will be sponsored jointly by the American Venereal Disease Association and the Experimental Therapeutics Study Section of the National Institutes of Health, Public Health Service.

The meeting will be held in the auditorium of the Federal Security Building, Independence Avenue between Third and Fourth Streets, the scientific sessions beginning each day at 10 a. m. The program includes papers on the fundamental biology and the clinical and epidemiological aspects of venereal disease. All persons interested in this branch of medical research are cordially invited to attend.

The annual business meeting of the American Venereal Disease Association will be held at 9 a. m. on Wednesday, April 25.

Copies of the program will be available about April 1. Requests for copies should be sent to Dr. Frederick W. Appel, Executive Secretary of the Experimental Therapeutics Study Section, Division of Research Grants, National Institutes of Health, Bethesda 14, Md. Inquiries should be addressed either to Dr. Appel or to Dr. William L. Fleming, Secretary of the American Venereal Disease Association, 750 Harrison Avenue, Boston 18, Mass.

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The printing of this publication has been approved by the Director of the Bureau of the Budget (August 10, 1949).

The PUBLIC HEALTH REPORTS, first published in 1878 under authority of an act of Congress of April 29 of that year, is issued weekly by the Public Health Service through the Division of Public Health Methods, pursuant to the following authority of law: United States Code, title 42, sections 241, 245, 247; title 44, section 220.

It contains (1) current information regarding the incidence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

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# Public Health Reports

VOLUME 66 | MARCH 2, 1951 | NUMBER 9

TUBERCULOSIS CONTROL ISSUE NO. 61

IN THIS ISSUE

Research Contributions of BCG Programs, I

Streptomycin Resistance of Tubercle Bacilli

FEDERAL SECURITY AGENCY

PUBLIC HEALTH SERVICE

## FEDERAL SECURITY AGENCY
*Oscar R. Ewing, Administrator*

**PUBLIC HEALTH SERVICE**
*Leonard A. Scheele, Surgeon General*

**Division of Public Health Methods**
*G. St. J. Perrott, Chief of Division*

## CONTENTS



This is the sixty-first of a series of special issues of PUBLIC HEALTH REPORTS devoted exclusively to tuberculosis control. The special issues began March 1, 1946, and appear the first week of each month. The articles are reprinted as extracts. Effective with the July 5, 1946, issue, these extracts may be purchased from the Superintendent of Documents, Government Printing Office, Washington 25, D. C., for 10 cents a single copy. Subscriptions are obtainable at $1.00 per year; $1.25 foreign.

# Public Health Reports

*Vol. 66* • MARCH 2, 1951 • *No. 9*

## Research Contributions of BCG Vaccination Programs

### I. Tuberculin Allergy as a Family Trait

By Carroll E. Palmer, M. D., and Sven Nissen Meyer, M.D.*

Throughout its long history, tuberculosis has been known as a family disease. In earlier times a predisposition or inherited tendency to consumption was believed to be the chief reason that it appeared to "run in families." In fact, belief in a family weakness was so generally accepted that no one thought it unusual or that the situation could be otherwise, when one after another in a family became ill and died of the disease.

With the development of more scientific knowledge, it became apparent that close association with a tuberculous person was the principal reason for the spread of the disease and its tendency to appear within family groups. The great importance of infection by human contact and the use of this knowledge as the keystone for developing effective tuberculosis control programs have more or less led to a disregard for the possible significance of hereditary or familial factors. When the disease has appeared to be particularly destructive in some families and benign in others, subtle influences of familial susceptibility have been regarded as more or less inconsequential compared with those involving intimacy and repetition of contact, virulence of infecting organism, or gross economic factors of housing and nutrition. The great lack of scientific knowledge of the role of heredity in human tuberculosis is partly a result of the great practical difficulties in separating the certainly powerful effects of exposure to human disease from the possible influences of familial constitution. In fact, considering critically the problems of scientific methodology and analysis, it may even be impossible in naturally occurring tuberculosis in human populations to determine if familial constitution has any influence at all on the development and course of the disease.

A most remarkable possibility (*1*) to investigate many problems in tuberculosis, including familial predisposition, now exists as a conse-

*From the Tuberculosis Research Office, World Health Organization, Copenhagen, Denmark.

quence of the extensive BCG vaccination programs which are under way in many places in the world. In place of observations on a relatively few tuberculous families where knowledge of the infecting organism, time and intensity of exposure, mode of infection, etc., are, in the best of circumstances, largely a matter of guesswork, observations can now be obtained on thousands of different family groups, *all of whom are given, at a known time, a relatively uniform, constant, artificial tuberculous infection.* Although vaccination with BCG may constitute a benign nonprogressive infection, many of the responses to vaccination must resemble to some extent those that occur with natural virulent tuberculous infections. Both infections have in common at least two extremely important characteristics: both produce sensitivity to tuberculin and, according to widely held views, some degree of immunity to subsequent infection.

The present paper and others planned to follow are attempts to probe the possibilities of obtaining, through BCG vaccination programs, more knowledge of the nature of human tuberculosis, particularly with respect to fundamental questions of familial resistance and susceptibility. The purpose of this first paper is simply to show that children from different families respond differently in acquiring sensitivity to tuberculin after vaccination with BCG. This new knowledge opens an entirely new approach to the study of the controversial and highly significant question: the relationship between allergy and immunity in human tuberculosis. If the capacity to become allergic to tuberculin is to a considerable extent a familial trait, and if, in turn, it is related to susceptibility and resistance to disease, it should be possible through this approach to evaluate in a way not otherwise possible the significance of familial factors in human tuberculosis.

## Material

Records suitable for the present study were obtained as part of a very extensive series of investigations on BCG vaccine undertaken cooperatively by the Danish State Serum Institute, the International Tuberculosis Campaign, the Tuberculosis Research Office of the World Health Organization, and the local health authorities in Denmark responsible for mass BCG vaccination of school children. Previous papers (*2*, *3*, *4*) give information on the scope and plan of the investigations. The second reference is particularly pertinent since it is based on the same series of observations used here and contains many details on the methods and data collected.

From a practical public health viewpoint, the cooperative BCG project was regarded simply as a routine vaccination service program for all of the school children in a small homogeneous rural area in Jutland, Denmark. From a technical standpoint, the program was

carried out according to rigid scientific standards. The tests and vaccinations were done by a special research field team operating under a carefully prepared protocol. Each separate operation was assigned to a single person on the team in order to avoid differences due to personal bias. Tuberculin reactions were carefully and objectively measured. All records were made and handled by clerical personnel particularly trained for the work. In addition to the usual routine data on tests and vaccinations, the names of the father and mother of each child were obtained in order to permit the grouping of the children into family aggregates.

The total enrollment of 4,200 children in 90 rural municipal schools constitutes the base population for the study. Of this number of registered children, 3,270 fulfilled the following requirements: They were not previously vaccinated, had a negative prevaccination tuberculin reaction, were vaccinated and had a completed postvaccination tuberculin test 10 weeks later. More than 99 percent of the children were between 7 and 14 years of age, and 50.5 percent were males. Among the 3,270 children, 1,751 belonged to 738 families, each consisting of 2 to 5 vaccinated children.

The intradermal Mantoux, using 10 and 100 T. U. (0.0002 and 0.002 mg. of PPD), was given for both the prevaccination and postvaccination tuberculin test. Readings of the reactions were made on either the 3d or the 4th day and included the careful measurement in millimeters of the widest transverse diameter of both erythema and induration and, as well, the classification of reactions into four types according to the density of induration. Children were vaccinated if their reactions did not exceed 6 millimeters of induration to the 10 T. U. test.

BCG vaccine, batch No. 869, prepared by the State Serum Institute in Copenhagen for routine vaccination work in Denmark and in the International Tuberculosis Campaign was used; 0.1 cc. was given by the intradermal method. Thirty-five different samples of the vaccine were actually used, graduated with respect to dosage, age of vaccine after preparation, and temperature of storage. Each of the 35 samples was used on approximately the same number of children attending one to four schools. The designed variations in the 35 samples of vaccine, while making the analysis slightly more complex, have been taken into account by the method of analysis.

## Method

The vaccinations in this project probably should be regarded as somewhat unusual in one respect: after 10 weeks almost every child had become allergic to tuberculin to the extent that he showed 6 or more millimeters of induration to the 10 T. U. Mantoux test. It is believed the particular batch of BCG used was a rather potent one.

Although the BCG infection apparently produced a fairly high level of allergy in all children, marked differences in postvaccination tuberculin reactions were recorded. It is usual to assume that such differences reflect differences in the degree of allergy attained—that is, that the larger and more severe the reaction, the greater the allergy. This assumption, explicitly accepted in the present analysis, may be simply stated as follows: Within the limitations of considerable experimental error, the transverse diameter of induration of the tuberculin reaction is a quantitative measure of the degree or level of postvaccination allergy.

Use of the size of the tuberculin reaction as an index of the allergy of an individual permits a quantitative analysis of the data and immediately raises a question as to which of a number of statistical methods is best suited to investigate whether children of different families exhibit different "familial" capacities to become allergic after BCG vaccination.

The technique known as the "analysis of variance" was chosen as the most appropriate for the purpose. Since many interested in the results of the study may not find a technical statistical presentation very satisfactory, a very general and somewhat oversimplified discussion will be given here, and the technical details reported in an appendix.

For present purposes, it may suffice to say that the term "variance" is used to denote a numerical measure of the differences that occur in a series of observations. Or, variance may be regarded as a kind of average, not of measurements themselves, but of the differences among them. Since one measurement may be larger or smaller than another for some particular reason, an "analysis of variance" becomes a determination of how much of the average difference, or variance, may be accounted for by one or more pertinent reasons.

Application of the analysis of variance to the present problem leads at once to a consideration of the particular reasons why the measured size of a tuberculin reaction in one child may differ from that of another. Two main categories of causes are readily visualized. The first is common to all scientific work and is generally referred to as experimental or observational error. Thus, reactions may appear to be different simply because we are not accurate enough in the technical procedures of vaccinating and of making and reading tuberculin tests. In one child a whole series of small errors may contribute to his apparently having a large postvaccination tuberculin reaction. In another child, who may actually have exactly the same allergy, the errors may be reversed with the result that he may show a considerably smaller reaction. Those who have had much experience in BCG work will know that observational errors are relatively large, even under the most exacting conditions, and will expect that a

substantial share of the average difference or the variance of tuberculin reactions will be due to this unavoidable but measurable cause.

The second major cause of differences is generally referred to as biological variation and it is the contribution of this factor to the variance of postvaccination tuberculin reactions that is of greatest interest here. It may be well to point out, again, the potential advantage of studying the question in BCG infections rather than in naturally occurring tuberculous infections. In the latter, sensitivity to tuberculin has been determined for many hundreds of thousands of persons and, although marked differences in the sensitivity of individuals are always found, it has never been possible to do more than to guess as to the reasons for these differences. This statement is patently true despite many published reports which imply, at least, that the primary factors responsible for producing differences in levels of allergy are virulence of the infecting organism, intimacy and duration of exposure, etc. BCG-produced allergy, obviously, can be affected to only a very small extent by similar influences. Except for experimental errors in vaccinating and tuberculin testing, BCG allergy primarily reflects an individual's allergenic capacity and a way is thus opened to study the biological causes of variation in allergy.

Enough has been written above to indicate that we shall be concerned here chiefly with the technical problem of separating biological variation in tuberculin sensitivity into two portions: that due to *differences among children within the same family* and that due to *differences among families* in their capacity to develop allergy.

## Results

The first requirement in the analysis is a determination of the experimental error in measuring postvaccination allergy, obtained by accepting certain assumptions and by using a somewhat indirect but quite satisfactory procedure. In many problems it is possible, by repeating the same procedures on the same persons, often at the same time, to estimate the experimental error in terms of the differences between what are essentially independent duplicated observations. Obviously, vaccinations cannot be independently duplicated on the same person. A fairly close approximation to this can be accomplished, however, by simultaneously vaccinating identical twins, under the assumption that differences in their responses will be due largely to variations in the techniques of vaccinating and tuberculin testing and to some degree, of course, to their individual differences.

From our whole series of BCG vaccine investigations results are available from vaccinating 61 pairs of like-sexed twins. This is not as large a number of pairs as would be desirable, nor are they all identical twins, which would be more suitable; nevertheless, as is indicated in

the later more technical section of the paper, the estimate of experimental error based on the study of these 61 pairs of twins is probably reasonably satisfactory for this purpose.

Application of this estimate of the experimental error to the variance of the total group leads to the conclusion that experimental error accounts for approximately one-half and biological variation the other half of the total variance found in measuring the postvaccination allergy of the 3,200 children in the study.

The second and more critical result of the study consists of the separation of the biological source of variation into the two components, a little more than half contributed by within-family differences and something less than half which arises because of between-family differences. In approximate and rather general terms, it is possible to conclude from this analysis, first: That the total observed differences between children are about equally due to experimental error and biological differences; and, second, that of the total biological variation in the present population, about one-half may be accounted for by factors which children share with their brothers and sisters, the other half by factors which children possess independent of their siblings.

## Discussion and Summary

The paper has two purposes: First, to point out the great possibilities of learning about tuberculosis through careful research done as part of public health service programs, for example, the extensive BCG vaccination programs being carried out in many places in the world today. Second, as an illustration of the possibilities of these ready-made research facilities, to show that the capacity to develop allergy to tuberculin after BCG vaccination is about as much a familial as an individual characteristic.

Material for the study was derived from a service BCG vaccination program carried out according to strict scientific standards on the population of about 4,000 registered school children living in a small homogeneous rural area in Jutland, Denmark.

The statistical technique of analysis of variance was applied to observations on the measured diameter of induration of postvaccination tuberculin reactions, the assumption being made that this measurement of the reaction would serve, within the limits of experimental error, as a quantitative index of the allergenic capacity of an individual child. One step in the analysis is based upon the result of vaccinating like-sexed twins. Such pairs, it was assumed, are sufficiently alike with respect to both heredity and environment to permit the interpretation that differences between their responses to vaccination will constitute a reasonably satisfactory estimate of the experimental error of vaccinating and tuberculin testing. By starting with

the assumption that the biological differences between like-sexed twins is zero, it was found that biological differences between brothers and sisters in the same family would be represented by a variance value of 3.1. When the population is extended to include all children in all of the different families studied, the variance nearly doubles, to reach a value of 5.4. This result was interpreted in general terms to mean that a very substantial share, nearly one-half, of the variation in a child's capacity to become allergic after vaccination is due to familial factors.

The most immediate practical value of this finding may be its bearing on the problem of revaccination. At present, one or more revaccinations are often given routinely if a person fails to develop a certain degree of tuberculin allergy. This is a reasonable procedure if dosage and technique of vaccination are the decisive factors. But if a lack of postvaccination allergy is caused by the individual's allergy-producing capacity, the whole matter of revaccination must be approached from an entirely new point of view.

As for its contribution to fundamental knowledge of tuberculosis, the significance of this study most probably will depend on the nature of the relationship between the capacity to develop allergy and susceptibility to tuberculous disease. The present study, of course, contributes no information on this point. On the other hand, tuberculosis is certainly concentrated in family groups, and this investigation strongly suggests that the capacity to become allergic to tuberculin is markedly influenced by familial factors. On general grounds it is difficult to believe that further research will show these two familial characteristics to be independent. And . . . *if* allergy and immunity are related, particularly in terms of common familial factors, BCG vaccination may be of as much importance as a technique for selecting "resistant" and "susceptible" individuals as for prophylaxis against the disease.

A number of investigations may be visualized immediately to study the relationship between allergenic capacity and immunity to tuberculosis. One investigation is already under way. From the group of 738 Danish families studied here, two subgroups have been selected, one in which the children developed a high degree of allergy, the other only a low degree. By studying the past history of tuberculosis morbidity and mortality in the adult members of these two family subgroups, it should be possible to learn something of the relationship of allergy and immunity if one exists. At the present time, we can only guess as to whether "good" allergenic capacity is associated with resistance to the disease, or whether the reverse might be the case. Denmark offers a remarkable opportunity for such an investigation because of its highly efficient system of diagnosis and reporting of tuberculosis morbidity and mortality. Because the

prevalence of tuberculosis in Denmark at present is extremely low, it would not appear profitable to attempt to follow all the vaccinated children, or members of their families, to determine future tuberculosis rates. Such an approach to the problem might, however, be undertaken in other countries where the prevalence of tuberculosis is greater.

In this study, as in most of those which deal with familial characteristics, it is not possible to separate the influences of heredity and environment. Experimental tuberculosis in laboratory animals, however, clearly indicates that hereditary factors can be of enormous significance in the development and course of the disease. Also, there is much general evidence from observations on human tuberculosis to indicate, for example, that certain races apparently are highly susceptible to the disease while others appear to be relatively much more resistant. Similar studies on white persons and Negroes living under similar environmental conditions in the United States should be relatively easy to carry out and might be very informative on this point.

It is difficult to speculate as to how far the findings reported here may be generalized. The rural Danish population under study probably represents almost as homogeneous a group of people, from the standpoint of heredity and environment, as will be found anywhere in the world today. When the present inquiry was first planned it was expected that familial differences in allergenic capacity would be very small in such a homogeneous population, even though large differences might exist among different races having widely different hereditary and environmental backgrounds. To find that children from these Danish families differ as much as they apparently do, accentuates the need for, and value of, coordinated public health research carried out on an international basis.

## ACKNOWLEDGMENT

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## APPENDIX

*Statistical Methods*

The principal question to be investigated is whether, with respect to post-vaccination tuberculin reactions, children in the same family tend to resemble each other more than do children belonging to different families. By an analysis of variance, one can test the hypothesis that the observed tuberculin reactions of siblings are random samples out of the total population of reactions of all the children. If this hypothesis can be rejected it would follow that the allergy producing capacity of an individual is in part a familial characteristic.

Suppose that in a population of vaccinated children there are $k$ sibling groups, or families, each having at least two vaccinated children. Let $n_i$ denote the number of vaccinated children in the $i^{th}$ family, and $x_{ij}$ the size of the reaction in the $j^{th}$ child in this family. The number of children in all $k$ families is

$$n=\sum_{i=1}^{k} n_i$$

The arithmetic mean of the reactions in the $i^{th}$ family is

$$\bar{x}_i=\frac{1}{n_i}\sum_{j=1}^{n_i} x_{ij} \text{ and}$$

the mean for all children in the $k$ families is

$$\bar{x}=\frac{1}{n}\sum_{i=1}^{k} n_i\bar{x}_i$$

The variance of reactions of all children is

$$s^2=\frac{1}{n-1}\sum_{i=1}^{k}\sum_{j=1}^{n_i}(x_{ij}-\bar{x})^2$$

The variance *between* families is

$$s_1^2=\frac{1}{k-1}\sum_{i=1}^{k} n_i(\bar{x}_i-\bar{x})^2$$

and the variance *within* families is

$$s_2^2=\frac{1}{n-k}\sum_{i=1}^{k}\sum_{j=1}^{n_i}(x_{ij}-x_i)^2$$

If family membership does not influence the reactions, $s^2$, $s_1^2$ and $s_2^2$ will all have the same expected value. If there are characteristic variations between families which do not prevail within families, $s_1^2$ will generally be greater than $s_2^2$. Large values of the ratio $s_1^2/s_2^2$ will consequently be rare if there are no character-

istic variations between families. Under certain conditions, including normal distribution of the reactions, it is possible through use of the $z$-test to determine whether a certain observed value of $s_1^2/s_2^2$ is compatible with the hypothesis of no family variations, or whether this hypothesis should be rejected. In the latter case the difference between $s^2$ and $s_2^2$ will afford an estimate of the variance of the mean values characterizing the individual families.

In the present analysis we have preferred to substitute for $s^2$ another estimate of the variance of reactions of all children, $S^2$, computed from the whole population studied which includes children who did not have vaccinated siblings.

The variance of postvaccination reactions of pairs of twins may be computed according to the formula:

$$s_T=\frac{1}{2k}\sum_{j=1}^{k}(X_{i1}-X_{i2})^2$$

where $k$ denotes the number of pairs and $X_{i1}$ and $X_{i2}$ the sizes of reactions of the two members of the $i^{th}$ pair. The same formula may be used to determine the variance of experimental errors of the tuberculin test, $X_{i1}$ and $X_{i2}$ denoting in this case the results of independent duplicate tests performed on a series of $k$ persons.

*Determination of Variances Within and Between Families, by Size of Induration of Postvaccination Reactions*

The material for the present study was taken from an investigation (*2*) primarily designed to determine the influence of variations in dosage, age, and temperature of storage on the allergy producing capacity of BCG vaccine. Altogether, 3,270 children attending 90 rural schools were vaccinated with 35 vaccine samples, each sample differing somewhat with respect to the three variables under study. Therefore, the analysis of variance must be made separately for the 35 different groups of children given the different types of vaccine.[1] Moreover, several factors, such as use of the same ampule of vaccine, uniform conditions for reading tests, etc., which may produce some uniformity of results within each school, led to a decision to make the analysis of variance *separately for each school.* The exclusion of 6 schools, in each of which there was only 1 family, reduced the material for the analysis to 84 schools, including 1,739 children in 732 families.

The details will not be reproduced here but the values for $s_1^2$, $s_2^2$ and the ratios $s_1^2/s_2^2$ were obtained for each of the 84 schools. Because of the small number of families in many schools, considerable random variation was apparent but there was an obvious predominance of large ratios at the expense of small ones. By weighting the variances from each school by the number of degrees of freedom,[2] the following average values were obtained:

$$\bar{s}_1^2=13.4,\ \bar{s}_2^2=8.9,\text{ and }\bar{s}_1^2/\bar{s}_2^2=1.50$$

According to the $z$-test, the probability of finding a ratio as large as 1.50 is less than 0.0005. This test of the statistical significance of the average ratio would be suitable if the variances from the separate schools were constant except for sampling variation. Although this condition is not completely satisfied, the result strongly suggests, nevertheless, the existence of differences among families in allergy-producing capacity.

An additional and slightly different approach was made to the problem of

[1] Reference (*2*) gives details, not reproduced here, of the actual frequency distributions of size of postvaccination reactions for the separate groups of children given different samples of the vaccine. It is shown that the frequency distributions are approximately normal and that the standard deviations of the distributions vary from a constant value only slightly more than would be expected by sampling errors.

[2] The degrees of freedom for $\bar{s}_1^2$ was 731, for $\bar{s}_2^2$ it was 1738–731=1007.

determining the statistical significance of the variations in the ratios, $s_1^2/s_2^2$. Table 1 shows the observed and theoretical distributions of the probabilities corresponding to the ratios found for the 84 separate schools. Assuming that there are no family variations, an average of 8.4 observations would be expected in each 10 percent interval, as indicated in the table. A chi square test reveals a highly significant difference between observed and expected distributions, corresponding to $P$ of less than 0.0005. This result also justifies the rejection of the hypothesis of no characteristic variations between families.

Table 1. *Variance ratios from 84 schools distributed according to corresponding probability fractiles (on the assumption of no family variations)*

| Probability fractiles for observed values of the variance ratios (percent) | Number of observed ratios in each interval | Expected number of ratios in each interval (on the assumption of no family variations) |
|---|---|---|
| 0-10 | 19 | 8.4 |
| 10-30 | 25 | 16.8 |
| 30-50 | 15 | 16.8 |
| 50-70 | 15 | 16.8 |
| 70-90 | 7 | 16.8 |
| 90-100 | 3 | 8.4 |
| Total | 84 | 84.0 |

An estimate of total variance, $\bar{s}^2=10.8$, was obtained by weighting by the number of degrees of freedom and averaging the 84 values of $s^2$ for the separate schools. This average is not significantly different from $\bar{S}^2=11.2$, obtained from all vaccinated children including those with no siblings in the school BCG program. Since the latter is computed from a larger number of observations (3,270) it is assumed to be a better estimate of the total variance and has been preferred to $\bar{s}^2$ for establishing the variance of the mean values characterizing individual families. Thus:

$$\bar{S}^2-\bar{s}_2^2=11.2-8.9=2.3$$

Random errors of sampling applicable to both $\bar{S}^2$ and $\bar{s}_2^2$ are not large and the value 2.3 may be considered quite well established. Thus it is evident that approximately 20 percent of the total variance of postvaccination reactions can be attributed to differences between families.

Before proceeding with a further analysis of other contributions to the total variance, it is necessary to consider whether certain factors, such as sex, age, and prevaccination tuberculin sensitivity, may account for the variance between families.

Differences in reactions in the two sexes cannot be responsible for the result, since, as shown in table 2, sibling groups can be regarded as random samples with respect to sex.

It can be shown also that the uniformity of reactions within families is not due to an agreement in the age of siblings. Table 3 gives the average size of postvaccination reactions by age, sex, and major subdivisions of the material according to dosage and temperature of storage of the vaccine used. As the table shows, the difference in the average size of induration varies within the relatively narrow range of about 1.5 millimeters over the whole age span of from 7 to 14 years. The variance of the mean indurations characterizing the individual age groups then will not exceed 0.19, assuming a rectangular distribution of the age component. In addition, an analysis of the records has shown that the age dispersion is gener-

Table 2. *Distribution of 738 families according to number and sex of 1,751 children included in family groups*

| Composition of family group tested | Number of families | Number of children |
|---|---|---|
| 2 child families | 525 | 1,050 |
| 2 males | 128 | |
| 1 male, 1 female | 268 | |
| 2 females | 129 | |
| 3 child families | 162 | 486 |
| 3 males | 24 | |
| 2 males, 1 female | 59 | |
| 1 male, 2 females | 53 | |
| 3 females | 26 | |
| 4 child families | 40 | 160 |
| 4 males | 2 | |
| 4 child families—Continued | | |
| 3 males, 1 female | 8 | |
| 2 males, 2 females | 17 | |
| 1 male, 3 females | 12 | |
| 4 females | 1 | |
| 5 child families | 11 | 55 |
| 5 males | 0 | |
| 4 males, 1 female | 2 | |
| 3 males, 2 females | 3 | |
| 2 males, 3 females | 3 | |
| 1 male, 4 females | 2 | |
| 5 females | 1 | |
| Total | 738 | 1,751 |

ally greater within families than in the whole population studied. This means that, on the average, the factor of age would cause slightly greater differences in reactions within each family than in the total material.

Table 3. *Mean size of induration in mm. of Mantoux 10 T. U. reactions 10 weeks after BCG vaccination according to sex and year of birth for 3,270 children vaccinated in November 1949*

| Year of birth | Standard vaccine stored at 2–4° C. | | Standard vaccine stored at 20° C. | | 4 times standard vaccine stored at 2–4° C. | |
|---|---|---|---|---|---|---|
| | M | F | M | F | M | F |
| 42–41 | 15.85 | 14.98 | 14.66 | 14.31 | 17.23 | 16.59 |
| 40–39 | 15.72 | 14.56 | 13.77 | 13.70 | 16.12 | 16.21 |
| 38–37 | 15.70 | 14.30 | 14.18 | 12.84 | 16.86 | 15.84 |
| 36–35 | 15.87 | 14.22 | 13.79 | 12.00 | 16.30 | 15.18 |

Children selected for vaccination in this study were those whose prevaccination tuberculin reaction was less than 6 millimeters of induration to the Mantoux 10 T. U. test. This criterion is generally considered adequate to eliminate all of those previously infected. It is possible, however, that the requirement for a negative reaction was not sufficient and that there might be some previously infected children among those vaccinated. If this occurred with greater frequency among children of the same family, it could cause an agreement in their post-vaccination reactions.

It is obvious, however, that this possibility will be of little quantitative importance in the present material, since the prevalence of reactors to Mantoux 10 T. U. is only 7 percent. The number of naturally infected individuals developing allergy too weak to produce a reaction of 6 millimeters of induration to 10 T. U. usually constitutes only a very small fraction of all the infected individuals and it is evident that this number will be insignificant as compared to the number of noninfected children. Furthermore, in order to effect an agreement in postvaccination reactions, the few children infected without developing a conspicuous allergy would have to belong to the same families.

In addition, if this were true, agreement between pre- and post-vaccination reactions should be expected. As shown in table 4, however, practically no correlation is obtained when the families are distributed according to their average

reactions to Mantoux 10 T. U. before and after vaccination (the postvaccination reactions being expressed as the deviations from the mean value of the corresponding vaccination group). A similar result, table 5, is obtained when prevaccination sensitivity is based on reactions to the Mantoux 100 T. U. test. In both cases there is a slight increase in the average size of postvaccination reactions for the families having the highest levels of prevaccination sensitivity but the number of families having these levels is too small to affect significantly the agreement between siblings. Although the details are not shown here, the correlation between prevaccination and postvaccination reactions with the person (not the family) as the unit gives corresponding results.

Table 4. *Distribution of 738 families by mean size of induration in mm. of Mantoux 10 T. U. reactions before and 10 weeks after BCG vaccination (induration of postvaccination reaction expressed as deviation from group mean)*

| Postvaccination | Prevaccination 4.5 | 3.5 | 2.5 | 1.5 | 0.5 | Total |
|---|---|---|---|---|---|---|
| −6.5 | ---- | 1 | ---- | ---- | 1 | 2 |
| −5.5 | ---- | ---- | ---- | 6 | 3 | 9 |
| −4.5 | ---- | ---- | 2 | 11 | 5 | 18 |
| −3.5 | ---- | 1 | 6 | 9 | 25 | 41 |
| −2.5 | ---- | 6 | 10 | 27 | 27 | 70 |
| −1.5 | 2 | 3 | 20 | 49 | 45 | 119 |
| −0.5 | ---- | 5 | 16 | 36 | 44 | 101 |
| +0.5 | 4 | 10 | 21 | 45 | 49 | 129 |
| +1.5 | ---- | 3 | 13 | 30 | 41 | 87 |
| +2.5 | 1 | 2 | 16 | 16 | 39 | 74 |
| +3.5 | 1 | 5 | 6 | 11 | 20 | 43 |
| +4.5 | ---- | 1 | 3 | 7 | 12 | 23 |
| +5.5 | ---- | ---- | 2 | 5 | 3 | 10 |
| +6.5 | ---- | 1 | ---- | 4 | 2 | 7 |
| +7.5 | ---- | 1 | ---- | 1 | 1 | 3 |
| +8.5 | ---- | 1 | ---- | 1 | ---- | 2 |
| Total | 8 | 40 | 115 | 258 | 317 | 738 |
| Mean of arrays | +0.02 | +0.68 | +0.20 | −0.10 | +0.17 | +0.11 |

Table 5. *Distribution of 714 families by mean size of induration in mm. of Mantoux 100 T. U. reactions before and Mantoux 10 T. U. reactions 10 weeks after BCG vaccination (induration of postvaccination reaction expressed as deviation from group mean)*

| Postvaccination | Prevaccination 8.5+ | 7.5 | 6.5 | 5.5 | 4.5 | 3.5 | 2.5 | 1.5 | 0.5 | Total |
|---|---|---|---|---|---|---|---|---|---|---|
| −6.5 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 2 | 2 |
| −5.5 | ---- | ---- | ---- | ---- | ---- | ---- | 2 | 4 | 3 | 9 |
| −4.5 | ---- | ---- | ---- | ---- | ---- | ---- | 5 | 3 | 10 | 18 |
| −3.5 | 1 | ---- | ---- | ---- | ---- | 3 | 4 | 8 | 25 | 41 |
| −2.5 | ---- | 2 | ---- | ---- | ---- | 3 | 7 | 16 | 38 | 66 |
| −1.5 | 1 | ---- | 2 | ---- | 2 | 10 | 14 | 44 | 45 | 118 |
| −0.5 | 1 | ---- | ---- | 2 | 3 | 9 | 15 | 32 | 36 | 98 |
| +0.5 | 2 | 1 | ---- | 5 | 6 | 9 | 12 | 29 | 58 | 122 |
| +1.5 | ---- | ---- | 2 | ---- | 3 | 3 | 15 | 19 | 39 | 81 |
| +2.5 | 1 | ---- | 3 | 1 | 1 | 6 | 13 | 16 | 31 | 72 |
| +3.5 | 1 | ---- | 2 | 1 | 2 | 2 | 6 | 14 | 14 | 42 |
| +4.5 | ---- | ---- | ---- | 1 | ---- | 2 | 4 | 5 | 11 | 23 |
| +5.5 | ---- | ---- | ---- | ---- | 1 | ---- | 3 | 6 | ---- | 10 |
| +6.5 | ---- | ---- | ---- | 1 | ---- | ---- | ---- | 2 | 4 | 7 |
| +7.5 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 2 | 1 | 3 |
| +8.5 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 1 | 1 | 2 |
| Total | 7 | 3 | 9 | 11 | 18 | 47 | 100 | 201 | 318 | 714 |
| Mean of arrays | +0.21 | −1.5 | +1.61 | +1.68 | +1.00 | +0.05 | +0.23 | +0.19 | −0.12 | +0.11 |

From the above review it seems justifiable to exclude similarity in sex, age, and prevaccination tuberculin sensitivity as significant factors responsible for the agreement among siblings (differences among families) in postvaccination tuberculin reactions.

### *Determination of the Variance Within Pairs of Twins*

Sixty-one pairs of twins, each consisting either of two males or two females, were BCG-vaccinated and retested after 10 weeks; 18 pairs were part of the sibling material already described, while 43 pairs were included in subsequent series of similar vaccine studies (*4*). In these latter projects children from the same family, or twins from the same pair, in some cases belonged to different groups which were given quite different BCG vaccines. In order to eliminate differences resulting from the use of different vaccines, each postvaccination reaction has been computed as a deviation from the mean value of the corresponding vaccination group.

Table 6 shows the correlation between reactions for the 61 pairs of twins. The variance within the pairs, calculated according to the formula given above, is:

$$s_T^2=5.8$$

This estimate of variance, being based on a small number of observations, has a relatively large standard error of approximately 1.0.

Table 6. *61 pairs of twins distributed by size of induration in mm. of both members to Mantoux 10 T. U. reactions 10 weeks after BCG vaccination (induration of each reaction expressed as deviation from the mean of corresponding vaccination group)*

| Reaction in second twin | Reaction in first twin | | | | | | | | | | | | | | | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | −9.5 | −8.5 | −3.5 | −2.5 | −1.5 | −0.5 | +0.5 | +1.5 | +2.5 | +3.5 | +4.5 | +5.5 | +6.5 | +7.5 | +8.5 | |
| +7.5 | | | | | | | | | | | | | 1 | | | 1 |
| +6.5 | | | | | | | | 1 | | | | | | | | 1 |
| +5.5 | | | | | | | | | 1 | | | | | | | 1 |
| +4.5 | | | | 1 | | 2 | 1 | | | | 2 | | 1 | | | 7 |
| +3.5 | | | | | | | | | | 1 | | 1 | | | | 2 |
| +2.5 | | | | | 1 | 2 | 2 | 1 | | | | | | | 1 | 7 |
| +1.5 | | | 2 | 1 | | 1 | | | 2 | 1 | | 1 | 1 | | | 9 |
| +0.5 | | | | | | 2 | 1 | 1 | 2 | | | 1 | | | | 7 |
| −0.5 | | | | 1 | 1 | 1 | | 1 | 1 | | | | | | | 5 |
| −1.5 | | | | 1 | 2 | 3 | 1 | 1 | | | 2 | | | | | 10 |
| −2.5 | | 1 | | 1 | | | 2 | 1 | 1 | | | | | | | 6 |
| −3.5 | | | | | | | 1 | | | | 1 | | | | | 2 |
| −4.5 | | | | | | | 1 | | | | | | | | | 1 |
| −5.5 | | | 1 | | | | | | | | | | | | | 1 |
| −10.5 | 1 | | | | | | | | | | | | | | | 1 |
| Total | 1 | 1 | 3 | 5 | 4 | 11 | 9 | 6 | 7 | 2 | 5 | 3 | 3 | | 1 | 61 |

### *Determination of the Variance of Tuberculin Tests Performed on the Same Person*

Since the variance between the reactions of twins is used as an estimate of the experimental error of the combined procedure of vaccinating and tuberculin testing, and since that variance cannot be considered as quantitatively well established, it has seemed worthwhile to include here some additional information on the experimental error of the more limited procedure of simply giving and reading a tuberculin test. During the past year, we have collected data on the results of duplicate tuberculin tests carried out with great care on several thousand persons. The material consists partly of BCG-vaccinated persons, partly of non-

vaccinated persons. Some groups were tested with Mantoux 5 T. U., others with 10 T. U. The personnel of the present study gave and read the tests.

The detailed results of these studies are to be published elsewhere, but it may be reported here that the variance of the experimental error of tuberculin testing is approximately 4.0, or a little less, without a distinct relationship to the level of tuberculin sensitivity, to the dose of tuberculin (5 or 10 T. U.), or to whether the allergy is from a natural or BCG infection. This finding is useful in evaluating our estimate of the variance between twins.

When duplicate tuberculin tests are performed on the same person at the same time, differences in the results can be attributed primarily to two sources; first, variations involved in the injection of the tuberculin into the skin, and second, variations arising from the process of reading (measuring) the reaction. When children are vaccinated, and later given a tuberculin test, differences in post-vaccination reactions can be attributed to three principal technical errors, the two that affect the tuberculin test plus the error of giving the vaccine. According to our studies, the variance of the errors of giving and reading tuberculin tests, at least in our material, is quite well established by a value of approximately 4.0 or a little less. To this value something must be added to obtain the variance of the combined procedure of tuberculin testing plus vaccinating. From observations on twins we find that the variance increases from about 4.0 to 5.8. Obviously, this probably over-estimates the total experimental error, since only a part of the group of twins can be considered monozygotic and a part of their variance may be due to environmental differences. Nevertheless, taking all of the available evidence into account, it would seem that the estimate of 5.8 as the variance of experimental error of vaccinating and tuberculin testing probably represents a reasonably satisfactory upper limit for our material.

*Summary of the Components of Total Variance of Postvaccination Reactions*

The above analyses represent an attempt to determine the principal components of the total variance in the size of induration of postvaccination tuberculin reactions. Of basic importance is the simple subdivision of the variance into two parts: first, variation due to random errors of observation and second, variation due to the operation of biological factors. Unfortunately, the separation of these two main components of total variance is probably less well established than are other subdivisions of the variance. However, using the variance, $s_T^2=5.8$, as the estimate of observational error, the variance due to biological factors may be estimated as:

$$\bar{S}^2-s_T^2=11.2-5.8=5.4$$

where $S^2$ is the previously estimated variance among all the children. In general terms, this indicates that of the total variance of postvaccination allergy about one-half is due to experimental error and one-half to biological influences.

With respect to biological factors, variance due to differences among families can be considered well established from the observations on the vaccination of children in over 700 families. Thus,

$$\bar{S}^2-\bar{s}_2^2=11.2-8.9=2.3$$

which permits the conclusion that somewhat less than half of the total biological variance is contributed by differences between families and somewhat more than half to differences between siblings in the same family.

The following tabulation summarizes the subdivision of the total variance:

| Source of variance | Variance | Percent of total variance |
|---|---|---|
| *Experimental error* | | |
| Total | 5.8 | 51.8 |
| Due to tuberculin testing | 4.0 | 35.7 |
| Due to vaccinating | 1.8 | 16.1 |
| *Biological variation* | | |
| Total | 5.4 | 48.2 |
| Within families | 3.1 | 27.7 |
| Between families | 2.3 | 20.5 |
| Total | 11.2 | 100.0 |

### *Agreement Within Families in Type of Induration of Postvaccination Reactions*

In addition to the measurement of the diameter of induration, postvaccination reactions were classified into 4 types according to density of the induration: Type I represents the most dense, types II and III intermediate categories, and type IV the soft, indefinite kind of induration. To a considerable extent, density of induration is independent of diameter and it seemed worth while to determine whether children in the same family tend to resemble each other with respect to the character of induration of their reactions. In this connection, as indicated in table 7, it is important to note that sex, age, and vaccine sample have considerable influence on the type of postvaccination induration.

TABLE 7. *Percentage frequency of type I induration of Mantoux 10 T. U. reactions 10 weeks after BCG vaccination according to sex and year of birth for 3,270 children vaccinated in November 1949*

| Year of birth | Standard vaccine stored at 2–4°C | | Standard vaccine stored at 20°C | | 4 times standard vaccine stored at 2–4°C | |
|---|---|---|---|---|---|---|
| | M | F | M | F | M | F |
| 42–41 | 54.4 | 60.5 | 36.1 | 46.5 | 70.7 | 74.2 |
| 40–39 | 47.7 | 55.1 | 27.9 | 30.4 | 54.9 | 68.2 |
| 38–37 | 46.5 | 46.8 | 26.0 | 23.7 | 58.5 | 62.8 |
| 36–35 | 45.1 | 39.1 | 9.8 | 12.9 | 43.6 | 51.4 |

In order to investigate whether siblings show agreement with respect to type of reaction, an index case has been chosen in each family, and the families have been divided into four classes in accordance with type of reaction (I to IV) of the index case. Thereafter the remaining siblings in each class have been distributed according to their type of reaction.

It is essential that the choice of index case be independent of type of reaction and that the sex and age distribution of siblings of the index cases be approximately uniform in all four classes. In order to attain these conditions the child whose date of birth was closest to July 1, 1939, (the mean age for all the children) was chosen as the index case in each family. The sex and age distribution of their siblings, separately for classes I, II, and III, are shown in tables 8 and 9; in class IV the number of children is too small to reproduce the distribution. It will be seen that the distributions are very similar in classes I and II; in class III, however, the frequency in the highest age group is a little lower than in I and II.

Table 8. *Percentage distribution by sex of siblings to index cases of types I–III*

| Index case type I | | Index case type II | | Index case type III | |
|---|---|---|---|---|---|
| M | F | M | F | M | F |
| 48.8 | 51.2 | 47.4 | 52.6 | 45.8 | 54.2 |

Table 9. *Percentage distribution by sex and year of birth of siblings to index cases of types I–III*

| Year of birth | Index case type I | | Index case type II | | Index case type III | |
|---|---|---|---|---|---|---|
| | M | F | M | F | M | F |
| 1942-41 | 33.8 | 33.5 | 32.2 | 29.9 | 29.6 | 29.7 |
| 1940-39 | 9.3 | 5.5 | 10.0 | 7.7 | 20.4 | 26.6 |
| 1938-37 | 27.1 | 20.3 | 27.1 | 22.6 | 40.7 | 37.5 |
| 1936-35 | 29.3 | 39.8 | 30.1 | 38.5 | 9.3 | 6.2 |
| Other years | .5 | .9 | .6 | 1.3 | | |
| Total | 100.0 | 100.0 | 100..0 | 100.0 | 100.0 | 100.0 |

Table 10 shows the 738 families distributed in four classes according to the type of reaction of the index case, and in each class the siblings are distributed according to their type of reaction. A comparison of the distributions in the four classes seems to indicate a familial resemblance; for example, the frequency of type I reactions in the siblings is higher in class I, in which the reaction of the index case is of type I, than in class II, in which the reaction of the index case is of type II. It is clear, however, that a simple comparison of the totals of the vaccination groups will involve some bias since the 35 vaccination groups are not equally represented in the four classes. For example, the children who have been given vaccine stored at 2–4° C. are most heavily represented in class I, whereas the classes II, III, and IV, successively, will comprise more children who have been given vaccine stored at 20° C.

Table 10. *Distribution of 738 families according to type of reaction of index case. Siblings of index case in each class distributed by their type of reaction*

| Type of reaction of index case | Number of index cases | Total number of siblings of index cases | Number of siblings having specified type of reaction | | | |
|---|---|---|---|---|---|---|
| | | | I | II | III | IV |
| Type I | 314 | 461 | 264 | 178 | 15 | 4 |
| Type II | 301 | 420 | 160 | 209 | 46 | 5 |
| Type III | 83 | 118 | 27 | 61 | 25 | 5 |
| Type IV | 10 | 14 | 1 | 5 | 7 | 1 |
| Total | 738 | 1,013 | 452 | 453 | 93 | 15 |

Since the usual way of eliminating the effect of the differing compositions of populations is unsatisfactory because of the small number of children in many of the vaccination groups, a slightly different method will be used to test the significance of differences in the frequency of a certain type of reaction in two classes. The procedure may be illustrated as follows: The number of siblings observed in the $k^{th}$ vaccination group of classes I and II is indicated by $m_k$ and

$n_k$, respectively. The numbers among these which are of type I are indicated by $x_k$ and $y_k$. The observed frequencies of type I will then be

$$p_k=\frac{x_k}{m_k} \text{ and } q_k=\frac{y_k}{n_k}$$

The difference between the two corresponding observed frequencies $p_k-q_k$, will then have a standard deviation which will not in any case be greater than

$$\sigma_k=\frac{1}{2}\sqrt{\frac{1}{m_k}+\frac{1}{n_k}}$$

the sum:

$$U=\sum_{k=1}^{35}\frac{p_k-q_k}{s_k}$$

will have an approximately normal distribution with a standard deviation which will not, at any rate, be greater than $\sqrt{35}=5.91$. If there are no differences between the frequencies of classes I and II, $U$ will have a mean value of 0.

A computation for the frequencies of type I in classes I and II results in

$$U=10.6$$

which is slightly less than twice the standard deviation.

A similar computation for the frequencies of type I in classes I and III yields:

$$U=16.3$$

which is about three times the standard deviation. In this case the latter is not more than $\sqrt{30}=5.47$ because no observations are available in five vaccination groups of class III.

This analysis, although less extensive than that dealing with the size of post-vaccination reactions, furnishes additional evidence of the existence of differences between families in the allergy produced by BCG vaccination.

# Resistance to Streptomycin of Tubercle Bacilli Isolated From Patients Treated With Streptomycin

By SHIRLEY H. FEREBEE, A.B. and FREDERICK W. APPEL, Ph.D.*

The advent of chemotherapy in the treatment of tuberculosis has been accompanied by a tremendous amount of laboratory investigation centering around the phenomenon of drug resistance. Much has been written about the nature and mechanism of the effect on the pathogenic organism resulting from chemotherapy and equally great discussion concerns the implications of drug resistance for the clinical management of the tuberculous. The present paper deals with one aspect of these problems; it concerns the results of *in vitro* tests for streptomycin resistance of tubercle bacilli in cultures obtained from patients observed in cooperative studies sponsored by the Public Health Service. The clinical and laboratory investigations on the use of streptomycin in the treatment of tuberculosis were planned and coordinated by the Tuberculosis Study Section of the Division of Research Grants and Fellowships of the National Institutes of Health. Investigators from several sections of the country participated in the cooperative studies with the aid of grants from the Division of Research Grants and Fellowships. Preliminary results of the clinical investigation were reported in an earlier paper.[1]

The necessity for uniformity of observations in the laboratory, as well as the clinical phase of these studies, led the Tuberculosis Study Section to designate the facilities of three bacteriological investigators as central laboratories for the study of streptomycin resistance of tubercle bacilli. Each clinical investigator sent cultures obtained from patients in the pulmonary tuberculosis studies to one of the three central laboratories. Results of the resistance testing were sent by the laboratories to a central office for analysis and correlation, as well as to the clinical investigator responsible for the management of the patient. The laboratory investigators were: Dr. Emil Bogen, Olive View Sanatorium, Olive View, Calif.; William Steenken, Jr., The Trudeau Laboratory, Trudeau, N. Y.; and Dr. Guy P. Youmans, Northwestern University Medical School, Chicago, Ill.

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[1] Long, E. R. and Ferebee, Shirley H.: A controlled investigation of streptomycin treatment in pulmonary tuberculosis. Pub. Health Rep. 65: 1421 (1950).

## Material and Methods

*Sanatorium Laboratory Procedure*

Resistance tests were sought for all patients receiving the prescribed 91-day regimen, 20 milligrams of streptomycin per day per kilogram of body weight, given in three equal doses. They were to be made on cultures from specimens taken the week before streptomycin treatment, during the 5th and 9th weeks of therapy, and during certain weeks after the discontinuance of streptomycin (the 14th, 27th, 40th, 53d, and 66th week from the beginning of therapy). The cooperating hospitals and sanatoria followed their usual techniques in the isolation and cultivation of tubercle bacilli, or the standard methods recommended by the National Tuberculosis Association. The cooperating clinical institutions used concentrated 24 hour sputum samples whenever possible, and gastric lavage specimens if sputum cultures were negative. Cultures, planted on whatever egg-yolk medium had proved satisfactory in past experience in the various tuberculosis hospitals, were sent to one of the central laboratories.

*Central Laboratory Test Procedures and Interpretation*

A standard procedure was established by the laboratory investigators for the uniform performance of the tests. From the primary cultures received by the sanatoria, subcultures were made in Dubos' liquid medium. When growth reached measurable density in the Dubos' cultures, the flasks were shaken vigorously to produce a uniform suspension for use as the source of inocula for the tests. For the resistance tests, a modified Herrold's egg-yolk agar medium was used.

In each test there were four cultures, one on a medium containing no streptomycin and three on media containing different concentrations of streptomycin. Initially, the concentrations were 1, 10, and 100 micrograms per milliliter of medium. Later a 3-microgram was substituted for the 1-microgram concentration. Tests were read at 14, 21, 28, and 35 days; the amount of growth in each culture tube was estimated on a 1+ to 4+ scale.

The level of bacterial sensitivity has been defined, for present purposes, as the highest concentration of streptomycin (mcg./ml.) in which significant growth appeared within 1 week of the date on which maximum growth had been achieved in the control tube. In general, growth in the control tube was rapid, usually reaching a maximum by the 21st day. In the present analysis, only three levels of sensitivity are distinguished: strongly resistant as evidenced by growth in the 100-microgram culture, moderately resistant as shown by growth in the 10-microgram culture, and sensitive.

Occasionally tests had to be repeated, especially those which failed to show rapid and abundant growth in the control culture, those exhibiting the same amount of growth in two or more concentrations, and those in which contamination or free moisture interfered with evaluation.

The time interval between receipt of a culture and performance of the sensitivity testing in the central laboratory was not uniform. The nature or extent of changes occurring during this interval is not known but the test results may have been influenced by this factor.

*Selection of Tests for Analysis*

According to the plan of the study, there should have been a complete series of seven sensitivity tests for each patient who received the scheduled dose of streptomycin (per kilo of body weight) for 91 days including the entire group of 270 patients treated in the pulmonary control study and 21 patients on this regimen in the pulmonary comparative regimens study. However, the combination of a variety of human, bacteriological, and mechanical factors resulted in the loss of a considerable number of the expected cultures. A large number of patients who left the hospital during the year's observation were lost to effective bacteriological observation at the proper intervals. Failure in some instances of the hospital laboratories to furnish properly prepared and uncontaminated cultures resulted in the loss of still others. In one instance, for example, the mechanical failure of a deep freeze unit resulted in the loss of a considerable number of cultures.

In addition, the precision and interpretation of the test itself was not nearly so clear-cut as had been assumed by those not working directly with the test but concerned only with its application in clinical management; equivocal and even contradictory test results were not infrequently obtained. Since the first tests included in this study were made in the fall of 1947, many refinements in technique have been introduced.

Test results from the Trudeau Laboratory and from the Northwestern University Laboratory have been combined for this presentation because of the close agreement obtained when identical cultures were tested in different laboratories. Since the results from Olive View Laboratory were somewhat different, it appeared that a different system of interpretation would be required for them. For the preparation of special cultures used for the equivalence tests, acknowledgment is made to Frank G. Petrik, bacteriologist at the Homer Folks Tuberculosis Hospital, Oneonta, N. Y. Mr. Petrik prepared a series of identical cultures which were sent to the three participating laboratories for sensitivity testing. The series, in which cultures were identified only by number, contained some duplicates, and this gave

some measure of the reproducibility of results within each laboratory as well as the agreement between laboratories.

Although the program produced a large number of sensitivity tests, the yield was disappointingly small in terms of the number of patients for whom a relatively complete series of tests was obtained. Of a total of 291 patients under study, sufficient data was secured for this analysis on only 157, or 54 percent. In other words, many of the tests were isolated observations with very few earlier or later results available for the same patient.

It is obviously necessary that all observation periods include cultures from the same patients. Otherwise, the inclusion of isolated tests would give a different patient population at each point of observation and it would be impossible to make sure that these shifting populations were comparable with respect to factors which may effect the emergence of resistance to streptomycin.

It should be mentioned that 18 patients were excluded from the analysis because cultures taken before the beginning of the study showed resistance to streptomycin. Inquiry into the previous management of these cases revealed that 5 had received streptomycin prior to this study, but for the remaining 13 no evidence of previous streptomycin therapy could be found.

In this report the analysis has been restricted to results from cultures of 157 patients represented at almost every scheduled observation period. The group includes some patients for whom estimates for equivocal or missing test results could be made with reasonable certainty on the basis of a level of sensitivity clearly indicated by tests given before and after the missing one in the series. In order to utilize as many off-schedule tests as possible, each "due" week prescribed in the protocol has been treated as the median of a class interval, containing approximately as many early tests as late ones. In the appendix table, the individual test results are listed for the 157 patients included in the analysis.

## Results

The significance of bacterial resistance to streptomycin has, in much of the literature, been considered in relation only to the population which continues to be bacteriologically positive. However, the importance of the resistance phenomenon depends not only on the frequency with which resistance develops in the positive cultures but also on how frequently cultures continue, in spite of drug therapy, to be positive. Let us suppose, for example, treatment with a new antibiotic produced resistant organisms in all positive cultures in patients treated more than 2 weeks, but that by the end of 2 weeks only 5 percent of the cultures were positive. Then, the occurrence

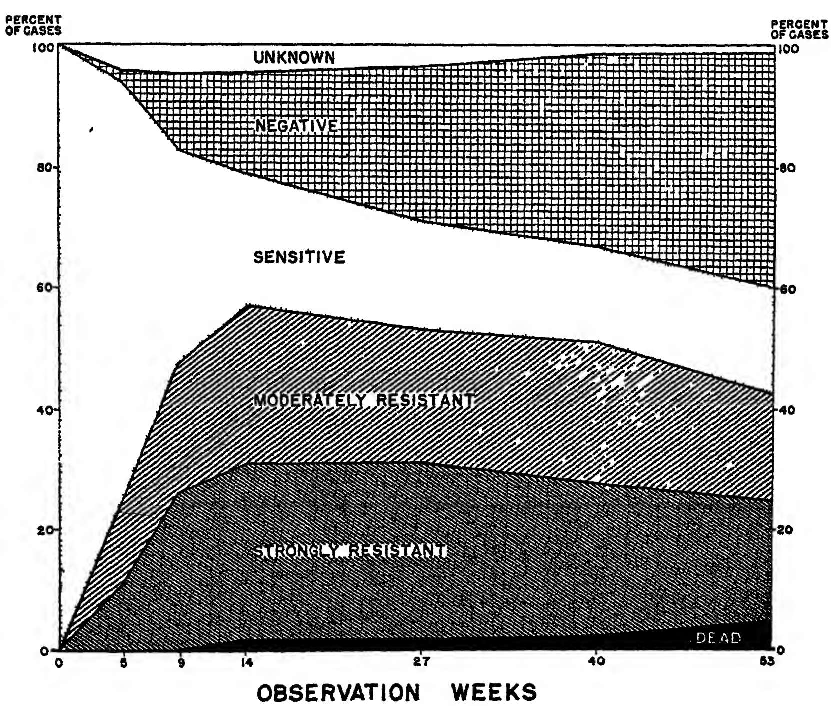
of resistance in all of the positive cultures might be of minor significance in evaluating the usefulness of a drug which could result in negative bacillary status for 95 percent of the patients treated.

Although this example is extreme, it illustrates how an erroneous interpretation may arise from a consideration of only the patients with positive cultures and explains the emphasis given in this report to a consideration of the entire distribution of the group at each observation period.

The bacteriological course for the 157 patients during the 53 weeks of observation is shown in table 1 and the chart. At the beginning of the study, the entire group had positive cultures sensitive to streptomycin. The number of cultures in which the presence of tubercle bacilli was not detected at subsequent points increased gradually throughout the period of observation until, by the end of the year, 40 percent had negative cultures. This is the group which, with respect to isolation of tubercle bacilli, reflects the most favorable action of the drug.

Seven, or 5 percent, of the 157 patients had died by the 53d week, representing the least favorable response to streptomycin therapy.

With the movement of patients during the year into these two ex-




*Percent distribution of 157 patients by bacteriological status and streptomycin resistance status at specific periods of observation.*

treme categories, the proportion of patients with positive cultures decreased steadily during the year from 100 percent at pretreatment to 55 percent in the 53d week. It is the cultures in this group which may be subdivided into resistant and sensitive categories at succeeding periods in time. But the dynamics of the emergence of resistant organisms involves the interchange between the sensitive and resistance groups, and the movement into the nonpositive categories, the negative, and the dead. The changing proportions with time give only the most elementary one-dimensional view of a problem which involves simultaneous movement in several directions.

Moderate resistance, that is, growth of the tubercle bacilli in the 10 microgram tubes of streptomycin-containing media, was, of course, absent in cultures of this series of patients at pretreatment, but by the 5th week of sensitivity testing, 15 percent of the 157 patients had positive cultures with moderately resistant organisms. Thereafter, the change was gradual over the remainder of the year, with a high of 26 percent at 14 weeks and a very gradual decrease to 18 percent at 53 weeks. Strong resistance had appeared in the positive cultures of 11 percent of the patients by the 5th week, with a continued rise to a high of 29 percent in the 14th week and a gradual decrease to 20 percent by the 53d week. If the two levels of resistance are considered together, 26 percent of the 157 patients had positive cultures which showed resistant bacilli by the 5th week, increasing to 55 percent by the 14th and decreasing to 38 percent by the end of the year. Resistance increased most sharply during the 13 weeks of drug therapy. Examina-

Table 1. *Distribution of 157 patients by bacteriological status and streptomycin resistance status at specified periods of observation*

| Status | Observation week from beginning of therapy | | | | | | |
|---|---|---|---|---|---|---|---|
| | Pretreatment | 5 | 9 | 14 | 27 | 40 | 53 |
| | Number | | | | | | |
| Total | 157 | 157 | 157 | 157 | 157 | 157 | 157 |
| Negative culture | 0 | 4 | 19 | 26 | 40 | 50 | 62 |
| Positive culture | 157 | 146 | 129 | 121 | 109 | 100 | 86 |
| Sensitive | 157 | 106 | 56 | 34 | 31 | 25 | 26 |
| Moderately resistant | 0 | 23 | 34 | 41 | 33 | 36 | 28 |
| Strongly resistant | 0 | 17 | 39 | 46 | 45 | 39 | 32 |
| Patient dead | 0 | 0 | 1 | 2 | 3 | 4 | 7 |
| Unknown | 0 | 7 | 8 | 8 | 5 | 3 | 2 |
| | Percent | | | | | | |
| Total | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |
| Negative culture | 0 | 2.5 | 12.1 | 16.5 | 25.5 | 31.9 | 39.5 |
| Positive culture | 100.0 | 93.0 | 82.2 | 77.1 | 69.4 | 63.7 | 54.7 |
| Sensitive | 100.0 | 67.5 | 35.7 | 21.7 | 19.7 | 15.9 | 16.5 |
| Moderately resistant | 0 | 14.7 | 21.7 | 26.1 | 21.0 | 22.9 | 17.8 |
| Strongly resistant | 0 | 10.8 | 24.8 | 29.3 | 28.7 | 24.9 | 20.4 |
| Patient dead | 0 | 0 | .6 | 1.3 | 1.9 | 2.5 | 4.5 |
| Unknown | 0 | 4.5 | 5.1 | 5.1 | 3.2 | 1.9 | 1.3 |

tion of the appendix table discloses only seven cases in whose cultures resistance initially appeared later than the 14th week: for five of the seven in the 27th week, and for two at 40 weeks. The material, it is true, is not large and chance fluctuation in the downward trend is obviously great but the decrease between the 14th and 53d week is not likely to be fortuitous since it occurs in both sub-groups, the moderately and strongly resistant. This must not, however, be interpreted as evidence of a reversion to streptomycin sensitive status since from the 14th week to the end of the year both categories of positive cultures, the sensitive and the resistant, decrease in size as the negative group increases. The trend of the group of patients with positive cultures sensitive to streptomycin declines sharply from 100 percent at pretreatment to 22 percent by 14 weeks and then gradually to 17 percent by the 53d week.

The question of the permanence of resistance to streptomycin cannot be determined by comparing the proportions of the group sensitive or resistant at different points in time, or even indeed by considering the entire spectrum of possible bacteriological change as shown in table 1. Such a tabulation does not show the amount or direction of movement of individuals between categories. Additional information about the bacteriological pattern of change is given in table 2, in which the status of the 157 patients at the end of the year has been correlated with the course of sensitivity of their cultures during the year. The table shows that resistance never developed in the cultures of 52 or roughly one-third of the 157 patients under study. In cultures of the remaining 106, resistance was reported at some time during the year's observation, and was maintained in the cultures of 87 of the 105 patients. Thus, in general, cultures which developed resistance did not become sensitive again within the 53-week period.

Perhaps the most significant information regarding resistance may be derived from an examination of the changes which occurred during the remainder of the year among patients classified according to their

Table 2. *Distribution of cultures of 157 patients classified by bacteriological status and streptomycin resistance status at 53 weeks, and by resistance status during previous year*

| Status at 53d week | Status during year | | | | |
|---|---|---|---|---|---|
| | Total | Never resistant | Resistance developed | | |
| | | | And maintained | And lost | Variable |
| Total | 157 | 52 | 87 | 12 | 6 |
| Negative culture | 62 | 34 | 27 | 1 | 0 |
| Positive culture: | | | | | |
| Sensitive | 26 | 16 | 0 | 10 | 0 |
| Moderately resistant | 28 | 0 | 25 | 0 | 3 |
| Strongly resistant | 32 | 0 | 30 | 0 | 2 |
| Patient dead | 7 | 2 | 3 | 1 | 1 |
| Unknown | 2 | 0 | 2 | 0 | 0 |

bacteriological status at 14 weeks. Fourteen weeks mark the end of the period of streptomycin therapy, and it is generally agreed, and also shown here, that resistance rarely develops after discontinuance of the drug. After that time, as shown in table 3, for the 27th, 40th, and 53d weeks, there is some irregular interchange of patients from one classification to another. The largest and most consistent change, however, is a progressive increase in the proportion of patients who became bacteriologically negative. Table 4 summarizes the data in this respect and shows that the rate of becoming negative after discontinuance of the drug is apparently rather remarkably influenced by the degree of sensitivity of the tubercle bacilli to streptomycin at 14 weeks. By the 53d week of observation, 38 percent of the patients with sensitive organisms, 36 percent of those with moderately resistant organisms, and only 15 percent of those with strongly resistant organisms had become bacteriologically negative. Further, although the number of cases in each category is not large, the stability of the trend in the change to negative status suggests that the differences, at least between the sensitive and strongly resistant, are not fortuitous. The development of streptomycin resistant organisms, particularly the highly resistant, may appear to prejudice the patient's chances of ceasing to produce positive cultures. However, the cause and effect relationship is not at all clear. It may well be that resistant organisms are found because the individuals do not respond well initially to therapy and, therefore, continue to excrete tubercle bacilli. The nature of relationship between sensitivity and subsequent ability to convert warrants further investigation directed specifically at this point.

## Summary

Streptomycin resistance tests were made on cultures of tubercle bacilli isolated at intervals during a period of one year from 157 patients who had been treated with streptomycin for 91 days. The results show that:

(1) At the end of 53 weeks tubercle bacilli could not be cultured from the sputa of 40 percent of the patients; tubercle bacilli could be isolated, however, at this time from the sputa of 55 percent of patients. The remaining 5 percent of the patients were dead.

(2) Approximately two-thirds of the patients still excreting tubercle bacilli in their sputa at the end of 53 weeks harbored tubercle bacilli which were moderately or strongly resistant to streptomycin. The other one third were excreting tubercle bacilli which were sensitive to streptomycin.

(3) Once tubercle bacilli in a patient become resistant to streptomycin this resistance tends to persist after the cessation of treatment, although reversion to streptomycin sensitivity was observed in cultures isolated from approximately 18 percent of the patients.

Table 3. *Distribution at succeeding observation points of the status of 157 patients classified by their bacteriological status at 14 weeks from the beginning of streptomycin therapy*

| Status | 14-week status: Total | Negative | Positive culture: Sensitive | Positive culture: Moderately resistant | Positive culture: Strongly resistant | Dead | Unknown |
|---|---|---|---|---|---|---|---|
| Number | 157 | 26 | 34 | 41 | 46 | 2 | 8 |
| At 27 weeks: | | | | | | | |
| Negative culture | 40 | 17 | 8 | 8 | 2 | 0 | 5 |
| Positive culture: | | | | | | | |
| Sensitive | 31 | 4 | 22 | 2 | 2 | 0 | 1 |
| Moderately resistant | 33 | 2 | 2 | 27 | 2 | 0 | 0 |
| Strongly resistant | 45 | 1 | 1 | 4 | 38 | 0 | 1 |
| Patient dead | 3 | 0 | 0 | 0 | 1 | 2 | 0 |
| Unknown | 5 | 2 | 1 | 0 | 1 | 0 | 1 |
| At 40 weeks: | | | | | | | |
| Negative culture | 50 | 22 | 10 | 8 | 5 | 0 | 5 |
| Positive culture: | | | | | | | |
| Sensitive | 25 | 2 | 17 | 1 | 4 | 0 | 1 |
| Moderately resistant | 36 | 2 | 4 | 27 | 3 | 0 | 0 |
| Strongly resistant | 39 | 0 | 3 | 4 | 32 | 0 | 0 |
| Patient dead | 4 | 0 | 0 | 0 | 1 | 2 | 1 |
| Unknown | 3 | 0 | 0 | 1 | 1 | 0 | 1 |
| At 53 weeks: | | | | | | | |
| Negative culture | 62 | 21 | 13 | 15 | 7 | 0 | 6 |
| Positive culture: | | | | | | | |
| Sensitive | 26 | 3 | 15 | 3 | 4 | 0 | 1 |
| Moderately resistant | 28 | 2 | 3 | 19 | 4 | 0 | 0 |
| Strongly resistant | 32 | 0 | 2 | 3 | 27 | 0 | 0 |
| Patient dead | 7 | 0 | 1 | 0 | 3 | 2 | 1 |
| Unknown | 2 | 0 | 0 | 1 | 1 | 0 | 0 |

Table 4. *Number and percent of negative cultures at 27, 40, and 53 weeks, from patients with positive cultures at 14 weeks, classified by streptomycin resistance status at 14 weeks*

| Streptomycin resistance status of cultures positive at 14 weeks | Number | Negative at 27 weeks | | Negative at 40 weeks | | Negative at 53 weeks | |
|---|---|---|---|---|---|---|---|
| | | Number | Percent | Number | Percent | Number | Percent |
| Sensitive | 34 | 8 | 23.5 | 10 | 29.4 | 13 | 38.2 |
| Resistant: | | | | | | | |
| Moderately | 41 | 8 | 19.5 | 8 | 19.5 | 15 | 36.6 |
| Strongly | 46 | 2 | 4.3 | 5 | 10.9 | 7 | 15.2 |

(4) In the majority of patients, the development of resistance of tubercle bacilli to streptomycin occurred during the period of administration of streptomycin.

(5) Out of 18 patients who could not be included in the program because their initial cultures of tubercle bacilli were found to be resistant to streptomycin, 5 had previously received streptomycin therapy whereas the remaining 13, insofar as could be determined, had not received streptomycin therapy.

(6) The development of streptomycin resistant organisms, particularly the highly resistant, may appear to prejudice the patient's chances of ceasing to produce positive cultures. However, the cause

and effect relationship is not at all clear. It may well be that resistant organisms are found because the individuals do not respond well initially to therapy and, therefore, continue to excrete tubercle bacilli. The nature of relationship between sensitivity and subsequent ability to convert warrants further investigation.

## APPENDIX

*Highest concentration of streptomycin (mcg./ml.) in which significant growth appeared in positive cultures obtained from 157 patients during 53 weeks of observation*

| Case No. | Observation week | | | | | | |
|---|---|---|---|---|---|---|---|
| | Pretreatment | 5 | 9 | 14 | 27 | 40 | 53 |
| 1 | 1 | *3 | 10 | 10 | 10 | *10 | *10 |
| 2 | *1 | 1 | 100 | 100 | 100 | Neg. | 3 |
| 3 | 1 | 1 | 1 | 1 | *1 | *1 | 3 |
| 4 | 1 | 100 | *100 | 100 | 100 | 100 | 100 |
| 5 | 1 | 100 | *100 | 100 | *100 | 100 | 100 |
| 6 | 1 | 10 | 100 | 100 | 1 | 100 | 100 |
| 7 | 1 | 1 | 100 | *10 | 10 | *10 | 10 |
| 8 | *3 | 100 | 100 | 100 | 100 | 100 | 100 |
| 9 | *1 | 1 | 100 | 100 | 100 | 100 | 100 |
| 10 | 1 | 1 | 10 | 1 | 1 | 100 | 100 |
| 11 | 1 | N. A. | 100 | 100 | Neg. | 10 | 0 |
| 12 | 1 | 10 | 100 | 100 | 100 | 100 | *100 |
| 13 | 1 | 100 | 100 | 100 | 100 | 100 | 100 |
| 14 | *3 | 10 | 100 | 100 | 100 | 100 | 100 |
| 15 | 1 | 1 | 100 | 100 | 100 | 1 | 10 |
| 16 | 1 | 100 | 100 | 100 | 100 | 100 | 100 |
| 17 | 1 | *100 | 100 | 100 | 100 | 100 | 3 |
| 18 | 1 | 100 | 100 | 100 | 100 | 100 | 100 |
| 19 | 1 | 100 | 100 | 100 | 100 | 100 | 100 |
| 20 | 1 | 1 | 1 | *1 | *1 | *1 | 0 |
| 21 | 1 | 1 | 100 | 100 | 100 | *100 | 100 |
| 22 | 0 | 10 | 10 | 10 | 10 | 10 | 10 |
| 23 | 1 | 10 | 100 | 100 | 100 | 100 | 100 |
| 24 | 1 | 10 | *10 | 10 | 10 | *10 | 10 |
| 25 | 1 | 1 | 10 | 10 | 10 | 10 | 10 |
| 26 | *1 | 1 | 1 | *10 | 10 | 10 | 10 |
| 27 | 1 | 1 | 10 | 10 | 10 | 10 | 10 |
| 28 | 1 | 1 | 10 | 10 | 10 | 3 | 3 |
| 29 | 1 | 1 | 10 | 10 | 10 | 10 | 10 |
| 30 | 1 | 100 | 100 | 10 | 10 | *10 | 10 |
| 31 | 3 | 1 | 3 | 3 | 10 | *100 | 100 |
| 32 | 1 | 10 | 10 | 10 | 10 | 10 | 10 |
| 33 | 1 | 10 | 10 | 10 | 10 | *10 | 10 |
| 34 | 1 | 1 | 1 | 10 | 10 | 10 | 10 |
| 35 | 1 | 100 | 100 | 100 | 100 | 100 | 100 |
| 36 | 1 | 1 | 100 | 100 | 100 | 100 | 100 |
| 37 | *1 | *1 | 1 | 100 | 100 | 100 | 100 |
| 38 | 1 | N. A. | N. A. | 100 | *100 | 100 | 100 |
| 39 | 1 | 10 | 100 | 100 | 100 | 100 | 100 |
| 40 | 1 | *1 | Neg. | Neg. | *1 | 1 | 1 |
| 41 | *1 | 1 | *1 | 1 | *1 | 1 | 1 |
| 42 | 1 | 100 | 100 | 100 | 100 | 100 | 10 |
| 43 | *1 | 1 | 10 | 10 | 10 | 10 | 10 |
| 44 | 1 | 100 | 1 | 3 | N. A. | 10 | 10 |
| 45 | *1 | 1 | 100 | 100 | *100 | 100 | 100 |
| 46 | 3 | 3 | 10 | 10 | 10 | 10 | 10 |
| 47 | 1 | 10 | 10 | 10 | 10 | 10 | 10 |
| 48 | 1 | *1 | *1 | 1 | *1 | 1 | 3 |
| 49 | 1 | Neg. | Neg. | Neg. | Neg. | Neg. | 3 |
| 50 | 1 | 1 | 1 | 1 | *3 | 3 | 10 |
| 51 | 1 | 1 | 1 | 10 | 10 | *10 | *100 |
| 52 | 1 | 1 | 1 | 100 | 3 | 3 | *3 |
| 53 | 1 | 1 | 1 | *100 | 100 | *10 | 10 |
| 54 | 1 | 1 | *10 | 10 | 10 | 10 | 3 |
| 55 | 1 | Neg. | 10 | 3 | 3 | 3 | 3 |
| 56 | 1 | 10 | Neg. | *10 | *10 | *10 | 10 |
| 57 | 1 | 1 | *1 | 3 | 3 | 3 | 3 |
| 58 | *3 | 10 | 10 | 10 | 10 | *10 | 100 |
| 59 | 1 | N. A. | N. A. | Neg. | Neg. | 10 | 10 |
| 60 | 1 | 1 | 1 | 100 | 100 | *100 | 100 |
| 61 | *1 | 1 | 1 | *1 | 3 | 3 | 3 |
| 62 | 1 | 1 | 1 | 1 | *1 | 10 | 0 |

See footnote at end of table.

*Highest concentration of streptomycin (mcg./ml.) in which significant growth appeared in positive cultures obtained from 157 patients during 53 weeks of observation*—Cont.

| Case no. | Observation week | | | | | | |
|---|---|---|---|---|---|---|---|
| | Pretreatment | 5 | 9 | 14 | 27 | 40 | 53 |
| 63 | 1 | 1 | 100 | 100 | *100 | *100 | 100 |
| 64 | 1 | 100 | 100 | 100 | 100 | 100 | 100 |
| 65 | 1 | *1 | 1 | 0 | Neg. | Neg. | 3 |
| 66 | 1 | 10 | 3 | 10 | 3 | 10 | *3 |
| 67 | 1 | 0 | 100 | 100 | 100 | 100 | 100 |
| 68 | 1 | 1 | 1 | 1 | Neg. | 10 | *10 |
| 69 | 1 | 1 | *10 | 10 | 10 | 10 | Neg. |
| 70 | 1 | *1 | 1 | *1 | 0 | 3 | *3 |
| 71 | 1 | 1 | 100 | 100 | 10 | 0 | Dead |
| 72 | 1 | 1 | 10 | 10 | *10 | 10 | Neg. |
| 73 | *1 | 1 | *1 | 1 | *1 | 1 | *1 |
| 74 | 0 | 1 | N. A. | 100 | N. A. | 1 | Neg. |
| 75 | 1 | 1 | 10 | *10 | 100 | 100 | Neg. |
| 76 | 1 | 10 | 10 | 10 | 10 | 10 | *10 |
| 77 | 1 | 10 | 10 | 1 | 1 | 100 | Dead |
| 78 | 1 | 1 | 100 | 100 | 100 | 100 | Dead |
| 79 | 1 | 1 | 1 | *1 | *1 | 3 | *3 |
| 80 | 1 | 10 | 100 | *100 | 100 | 10 | Neg. |
| 81 | 1 | 100 | 100 | Neg. | Neg. | 0 | Neg. |
| 82 | *1 | 1 | 3 | *3 | 1 | 3 | *3 |
| 83 | 1 | 1 | 100 | 100 | 100 | 100 | *100 |
| 84 | 1 | 10 | *10 | *10 | 100 | 100 | Neg. |
| 85 | *1 | *1 | Neg. | 1 | Neg. | 3 | Neg. |
| 86 | 1 | *3 | 10 | N. A. | 3 | 3 | *3 |
| 87 | 1 | 1 | N. A. | 10 | 10 | 10 | Neg. |
| 88 | 1 | 1 | Neg. | 10 | 3 | 10 | *10 |
| 89 | *3 | 100 | 100 | 100 | 100 | 100 | *100 |
| 90 | 1 | 10 | 100 | 100 | 100 | 100 | *100 |
| 91 | 1 | 0 | 0 | Neg. | 3 | 10 | *10 |
| 92 | 1 | Neg. | Neg. | 10 | Neg. | 10 | 10 |
| 93 | 0 | 0 | 10 | *10 | 100 | 100 | 100 |
| 94 | 0 | 0 | 10 | 10 | 100 | 100 | Neg. |
| 95 | 1 | 1 | 10 | 10 | 10 | Neg. | Neg. |
| 96 | 1 | *1 | *1 | 1 | 1 | *1 | *1 |
| 97 | 1 | 1 | 100 | 100 | 100 | *100 | Neg. |
| 98 | 1 | 1 | 1 | Neg. | 100 | Neg. | Neg. |
| 99 | 1 | 1 | *10 | 10 | 10 | N. A. | N. A. |
| 100 | 1 | 1 | 100 | 100 | 100 | N. A. | N. A. |
| 101 | 1 | *10 | 100 | 100 | 100 | *100 | Neg. |
| 102 | 1 | 1 | 1 | N. A. | 100 | Dead | Dead |
| 103 | 0 | 0 | 0 | 0 | 0 | Neg. | Neg. |
| 104 | 1 | 1 | 1 | 1 | 1 | Neg. | Neg. |
| 105 | 1 | 1 | 1 | *1 | 10 | *10 | Neg. |
| 106 | 1 | 1 | 1 | 1 | 1 | Neg. | Neg. |
| 107 | 1 | 1 | 1 | 1 | 100 | Neg. | Neg. |
| 108 | *1 | 1 | Neg. | Neg. | 3 | Neg. | *3 |
| 109 | 1 | *1 | *1 | 3 | 3 | 3 | Neg. |
| 110 | 1 | 1 | 1 | 100 | 100 | Neg. | Neg. |
| 111 | 1 | Neg. | Neg. | Neg. | 10 | Neg. | Neg. |
| 112 | 3 | 100 | 100 | 100 | 100 | 100 | 100 |
| 113 | 1 | *10 | Neg. | Neg. | 10 | Neg. | Neg. |
| 114 | 0 | 3 | 3 | Neg. | 3 | Neg. | Neg. |
| 115 | *3 | 3 | 10 | 100 | 10 | Neg. | *10 |
| 116 | 1 | 1 | 1 | 10 | Neg. | Neg. | Neg. |
| 117 | *1 | 1 | 1 | 1 | *1 | *1 | *1 |
| 118 | 1 | 1 | *1 | 1 | *1 | *1 | Neg. |
| 119 | 1 | 1 | *10 | 10 | Neg. | Neg. | Neg. |
| 120 | *1 | 1 | *10 | 100 | *100 | Neg. | Neg. |
| 121 | 1 | N. A. | 10 | *10 | Neg. | Neg. | Neg. |
| 122 | 0 | *1 | Neg. | 1 | Neg. | Neg. | Neg. |
| 123 | 1 | 10 | *10 | 100 | Dead | Dead | Dead |
| 124 | 0 | 3 | 3 | 3 | Neg. | Neg. | *Neg. |
| 125 | 1 | N. A. | N. A. | 10 | Neg. | Neg. | Neg. |
| 126 | 1 | 1 | 1 | 1 | Neg. | Neg. | Neg. |
| 127 | 1 | 1 | 10 | 10 | Neg. | *10 | Neg. |
| 128 | 1 | 100 | *100 | 100 | Neg. | Neg. | Neg. |
| 129 | 1 | 1 | 1 | 1 | Neg. | Neg. | Neg. |
| 130 | 1 | N. A. | Neg. | 10 | *10 | Neg. | Neg. |
| 131 | 3 | 3 | *3 | 3 | Neg. | Neg. | Neg. |
| 132 | 1 | *1 | 0 | N. A. | N. A. | Neg. | Neg. |
| 133 | 1 | *1 | 1 | N. A. | Neg. | *Neg. | Neg. |
| 134 | 1 | 10 | 10 | *10 | Neg. | Neg. | Neg. |
| 135 | 1 | 1 | 3 | N. A. | Neg. | Neg. | Neg. |
| 136 | 1 | 1 | 1 | Neg. | Neg. | *Neg. | *Neg. |
| 137 | 1 | 1 | 1 | N. A. | Neg. | N. A. | Neg. |
| 138 | 1 | *1 | 1 | Neg. | Neg. | Neg. | Neg. |

See footnote at end of table.

*Highest concentration of streptomycin (mcg./ml.) in which significant growth appeared in positive cultures obtained from 157 patients during 53 weeks of observation*—Cont.

| Case no | Observation week | | | | | | |
|---|---|---|---|---|---|---|---|
| | Pretreatment | 5 | 9 | 14 | 27 | 40 | 53 |
| 139 | 1 | 1 | 1 | Neg. | Neg. | Neg. | Neg. |
| 140 | 1 | *1 | 1 | N. A. | Neg. | Neg. | *Neg. |
| 141 | *1 | 1 | 1 | Neg. | Neg. | Neg. | Neg. |
| 142 | 1 | 1 | 1 | Dead | Dead | Dead | Dead |
| 143 | 1 | 1 | 1 | Neg. | Neg. | Neg. | Neg. |
| 144 | 1 | 1 | 1 | N. A. | Neg. | Neg. | *Neg. |
| 145 | *0 | *0 | 0 | Neg. | Neg. | Neg. | Neg. |
| 146 | *1 | 1 | Neg. | Neg. | Neg. | Neg. | Neg. |
| 147 | 1 | 10 | Neg. | *10 | Neg. | Neg. | Neg. |
| 148 | 1 | 1 | Dead | Dead | Dead | Dead | Dead |
| 149 | *1 | 3 | N. A. | Neg. | Neg. | Neg. | *Neg. |
| 150 | 1 | N. A. | Neg. | Neg. | Neg. | Neg. | Neg. |
| 151 | 1 | 1 | Neg. | Neg. | Neg. | *Neg. | *Neg. |
| 152 | 1 | 1 | Neg. | Neg. | N. A. | Neg. | Neg. |
| 153 | 1 | 1 | N. A. | Neg. | N. A. | Neg. | *Neg. |
| 154 | *1 | 1 | N. A. | Neg. | Neg. | Neg. | *Neg. |
| 155 | 1 | 1 | Neg. | Neg. | Neg. | Neg. | Neg. |
| 156 | 0 | 1 | Neg. | Neg. | Neg. | Neg. | *Neg. |
| 157 | 1 | 3 | Neg. | Neg. | Neg. | Neg. | Neg. |

* Estimated from conflicting test results or assumed from the unchanging trend in preceding and succeeding tests. N. A.—Not available.

# Incidence of Disease

*No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring*

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## UNITED STATES

### Reports From States for Week Ended February 10, 1951

*Measles.* The number of new cases of measles increased for the current week to 12,831 as compared with 11,030 for the previous week and the 5-year median of 10,756 cases. Data exclude Washington State for which no report was received.

*Influenza.* There are no indications of widespread prevalence of epidemic influenza in the United States at the present time. Localized epidemics of respiratory diseases are being reported, in some of which A-prime virus has been isolated, such as Gordo, Ala., and a few military establishments. Mortality reports of 106 major cities in the United States have shown no increase which would suggest the occurrence of the type of disease prevalent in England and characterized by a relatively high mortality in the older ages.

### Reports of Epidemics

*Respiratory Infections.* D. H. Stevens, Maine Commissioner of Health and Welfare, has reported that an influenza-like illness caused the absence of about 200 pupils in the Waterville, Maine, schools. The type of infection has not been determined by laboratory examination.

Dr. W. L. Halverson, Director of the California Department of Public Health, has reported that mild respiratory infections are spreading to various sections of the State. School absences are reported to be 25 to 30 percent of enrollment with a high rate of infection in teachers.

### NIH Influenza Information Center

The regional laboratory in the California Department of Public Health reports six cases of influenza diagnosed by hemagglutination-inhibition test. Five of these were A-prime, and the sixth, pending additional test, has been classified as indeterminate. These, like the three cases reported 2 weeks ago, have all been from the San Francisco Bay area.

The regional laboratory at Montgomery, Ala., reports that one of four throat washings collected from Gordo, Ala., January 23 yielded influenza A-prime virus.

The Naval Medical Research Unit No. 4, Great Lakes, Ill., reports


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the isolation of influenza virus tentatively identified as A-prime from four of eight throat washings from selected cases of influenza. The report states that a minor epidemic has been in progress during January but is now declining.

The Division of Preventive Medicine of the Office of the Surgeon General, Department of the Army, reports that at the Second Army Laboratory, of seven paired serum specimens obtained from Fort Knox, Ky., during January, one showed a rise in hemagglutination-inhibition titer for A, and two for A-prime influenza virus. The Sixth Army Laboratory has reported a rise in hemagglutination-inhibition titer for influenza B virus in paired sera obtained at Camp Cook, Calif., in January. During January, 42 paired samples were tested in this laboratory, and a total of 3, including 2 previously reported and 1 here reported, gave serologic evidence of influenza infection. For the week ended February 10, the Sixth Army Laboratory reported a rise in titer of a paired serum from Camp Cook to both A and A-prime influenza virus and a titer rise in two paired sera to A-prime. From the Oakland Army Base, one paired serum showed a rise in titer to virus A: from Mather Air Force Base, one showed a rise in titer to type A; from Travis, two paired sera showed an increase in titer to A-prime virus; and from Norton, one serum showed a rise in titer to B virus. No unusually large amount of respiratory disease has been reported in the military forces in the Sixth Army area.

*Comparative Data for Cases of Specified Reportable Diseases: United States*

[Numbers after diseases are International List numbers, 1948 revision]

| Disease | Total for week ended— | | 5-year median 1946–50 | Seasonal low week | Cumulative total since seasonal low week | | 5-year median 1945–46 through 1949–50 | Cumulative total for calendar year— | | 5-year median 1946–50 |
|---|---|---|---|---|---|---|---|---|---|---|
| | Feb. 10, 1951 | Feb. 11, 1950 | | | 1950–51 | 1949–50 | | 1951 | 1950 | |
| Anthrax (062) | ------ | ------ | 1 | (1) | (1) | (1) | (1) | 8 | 2 | 7 |
| Diphtheria (055) | 93 | 154 | 189 | 27th | [2] 3,484 | 5,324 | 7,753 | [2] 577 | 1,053 | 1,395 |
| Encephalitis, acute infectious (082) | 10 | 17 | 8 | (1) | (1) | (1) | (1) | 56 | 67 | 45 |
| Influenza (480–483) | 3,354 | 3,171 | 3,171 | 30th | 28,628 | 25,501 | 30,613 | 14,086 | 14,917 | 14,917 |
| Measles (085) | 12,831 | 6,564 | 11,260 | 35th | 84,566 | 48,823 | 65,666 | 55,865 | 29,693 | 39,542 |
| Meningitis, meningococcal (057.0) | 101 | 94 | 94 | 37th | [3] 1,598 | 1,442 | 1,442 | [3] 630 | 529 | 520 |
| Pneumonia (490–493) | 1,950 | 2,335 | ------ | (1) | (1) | (1) | (1) | 10,211 | 13,678 | ------ |
| Poliomyelitis, acute (080) | 104 | 117 | 48 | 11th | [2] 33,029 | 42,172 | 25,203 | [2] 811 | 698 | 406 |
| Rocky Mountain spotted fever (104) | ------ | ------ | ------ | (1) | (1) | (1) | (1) | 2 | 6 | 3 |
| Scarlet fever (050) [4] | 2,342 | 1,871 | 2,646 | 32d | 28,492 | 26,410 | 38,436 | 12,801 | 9,971 | 15,039 |
| Smallpox (084) | ------ | 3 | 4 | 35th | 12 | 17 | 41 | 4 | 9 | 20 |
| Tularemia (059) | 9 | 23 | 23 | (1) | (1) | (1) | (1) | 93 | 145 | 145 |
| Typhoid and paratyphoid fever (040,041) [5] | 28 | 51 | 45 | 11th | [2] 3,151 | 3,641 | 3,657 | [2] 236 | 268 | 253 |
| Whooping cough (056) | 1,446 | 2,881 | 1,921 | 39th | 31,552 | 35,886 | 36,943 | 9,950 | 14,350 | 13,648 |

[1] Not computed. [2] Additions: Diphtheria—North Carolina, week ended Jan. 13, 1 case; poliomyelitis—Illinois, week ended Jan. 27, 1 case; paratyphoid fever—District of Columbia, week ended Jan. 27, 1 case and week ended Feb. 3, 2 cases. [3] Deduction: Meningitis—North Carolina, week ended Jan. 13, 1 case. [4] Including cases reported as streptococcal sore throat. [5] Including cases reported as salmonellosis.

NOTE.—Data exclude report from Washington State for week ended Feb. 10 for which no report was received.

## *Reported Cases of Selected Communicable Diseases: United States, Week Ended February 10, 1951*

[Numbers under diseases are International List numbers 1948 revision]

| Area | Diphtheria (055) | Encephalitis, infectious (082) | Influenza (480–483) | Measles (085) | Meningitis, meningococcal (057.0) | Pneumonia (490–493) | Poliomyelitis (080) |
|---|---|---|---|---|---|---|---|
| **United States** | **93** | **10** | **3,354** | **12,831** | **101** | **1,950** | **104** |
| **New England** | **2** | — | **70** | **643** | **8** | **62** | — |
| Maine | — | — | 67 | 7 | 2 | 14 | — |
| New Hampshire | — | — | — | 6 | 1 | 1 | — |
| Vermont | — | — | — | 147 | 1 | — | — |
| Massachusetts | 2 | — | — | 357 | 1 | — | — |
| Rhode Island | — | — | 1 | 3 | 1 | — | — |
| Connecticut | — | — | 2 | 123 | 2 | 47 | — |
| **Middle Atlantic** | **10** | **2** | **8** | **1,704** | **18** | **242** | **11** |
| New York | 3 | 1 | [1] 5 | 529 | 6 | 107 | 9 |
| New Jersey | — | 1 | 3 | 324 | 3 | 78 | 1 |
| Pennsylvania | 7 | — | — | 851 | 9 | 57 | 1 |
| **East North Central** | **6** | **6** | **46** | **2,990** | **13** | **170** | **3** |
| Ohio | 4 | — | 2 | 1,100 | 7 | — | — |
| Indiana | — | — | 20 | 235 | — | 15 | 2 |
| Illinois | — | 1 | 22 | 391 | 2 | 95 | — |
| Michigan | 2 | 5 | 2 | 384 | 3 | 60 | 1 |
| Wisconsin | — | — | — | 880 | 1 | — | — |
| **West North Central** | **4** | **1** | **17** | **794** | **6** | **143** | **6** |
| Minnesota | — | — | 2 | 100 | 1 | 28 | 1 |
| Iowa | — | — | — | 20 | 1 | 1 | 2 |
| Missouri | 3 | 1 | 2 | 319 | 3 | 1 | 1 |
| North Dakota | — | — | 13 | 50 | 1 | 102 | — |
| South Dakota | — | — | — | 43 | — | 1 | 1 |
| Nebraska | — | — | — | — | — | — | 1 |
| Kansas | 1 | — | — | 262 | — | 10 | — |
| **South Atlantic** | **22** | — | **942** | **899** | **18** | **174** | **17** |
| Delaware | — | — | — | 14 | 1 | — | — |
| Maryland | 1 | — | — | 38 | 1 | 38 | 3 |
| District of Columbia | — | — | — | 43 | — | 16 | 1 |
| Virginia | 7 | — | 514 | 261 | 3 | 80 | 1 |
| West Virginia | 2 | — | 265 | 67 | — | 17 | 4 |
| North Carolina | 4 | — | — | 129 | 4 | — | — |
| South Carolina | 2 | — | 97 | 5 | 1 | 7 | — |
| Georgia | 6 | — | 66 | 290 | 4 | 16 | 3 |
| Florida | — | — | — | 52 | 4 | — | 5 |
| **East South Central** | **14** | — | **728** | **224** | **12** | **68** | **7** |
| Kentucky | 1 | — | 1 | 74 | 1 | 10 | — |
| Tennessee | 1 | — | 43 | 17 | — | — | 1 |
| Alabama | 9 | — | 673 | 30 | 8 | — | 4 |
| Mississippi | 3 | — | 11 | 103 | 3 | 58 | 2 |
| **West South Central** | **18** | **1** | **643** | **3,256** | **17** | **889** | **19** |
| Arkansas | 2 | — | 480 | 222 | 1 | 51 | — |
| Louisiana | — | 1 | 3 | 27 | 2 | 16 | 7 |
| Oklahoma | 3 | — | 160 | 413 | 3 | 84 | 4 |
| Texas | 13 | — | — | 2,594 | 11 | 738 | 8 |
| **Mountain** | **9** | — | **711** | **1,298** | **4** | **113** | **6** |
| Montana | 1 | — | 102 | 31 | 1 | — | — |
| Idaho | — | — | — | 18 | — | — | — |
| Wyoming | 1 | — | — | 97 | — | — | 1 |
| Colorado | 5 | — | 99 | 869 | 1 | 39 | 2 |
| New Mexico | — | — | 2 | 12 | — | 34 | 2 |
| Arizona | 2 | — | 508 | 208 | 2 | 40 | 1 |
| Utah | — | — | — | 63 | — | — | — |
| Nevada | — | — | — | — | — | — | — |
| **Pacific** | **8** | — | **189** | **1,023** | **5** | **89** | **35** |
| Washington | [2] | [2] | [2] | [2] | [2] | [2] | [2] |
| Oregon | 4 | — | 56 | 47 | — | 36 | 6 |
| California | 4 | — | 133 | 976 | 5 | 53 | 29 |
| Alaska | — | — | — | — | — | — | — |
| Hawaii | — | — | 1 | — | 1 | — | 2 |

[1] New York City only.
[2] Report not received.

*Reported Cases of Selected Communicable Diseases: United States, Week Ended February 10, 1951*—Continued

[Numbers under diseases are International List numbers, 1948 revision]

| Area | Rocky Mountain spotted fever (104) | Scarlet fever (050) | Small-pox (084) | Tulare-mia (059) | Typhoid and para-typhoid fever [1] (040, 041) | Whooping cough (056) | Rabies in animals |
|---|---|---|---|---|---|---|---|
| **United States** | | 2,342 | | 9 | 28 | 1,446 | 98 |
| **New England** | | 252 | | 3 | 1 | 181 | |
| Maine | | 10 | | | | 44 | |
| New Hampshire | | 16 | | | | 4 | |
| Vermont | | 16 | | | | 12 | |
| Massachusetts | | 173 | | | 1 | 67 | |
| Rhode Island | | 5 | | 2 | | 24 | |
| Connecticut | | 32 | | | | 30 | |
| **Middle Atlantic** | | 419 | | | 5 | 237 | 10 |
| New York | | [2] 225 | | | | 108 | 9 |
| New Jersey | | 53 | | | 2 | 57 | |
| Pennsylvania | | 141 | | | 3 | 72 | 1 |
| **East North Central** | | 631 | | 1 | 1 | 215 | 14 |
| Ohio | | 193 | | | 1 | 29 | 2 |
| Indiana | | 42 | | | | 36 | 10 |
| Illinois | | 74 | | | | 26 | |
| Michigan | | 265 | | 1 | | 73 | 2 |
| Wisconsin | | 57 | | | | 51 | |
| **West North Central** | | 120 | | | 2 | 80 | 9 |
| Minnesota | | 15 | | | | 9 | 1 |
| Iowa | | 14 | | | | 3 | 8 |
| Missouri | | 35 | | | | 10 | |
| North Dakota | | 1 | | | | 3 | |
| South Dakota | | 5 | | | | 4 | |
| Nebraska | | 6 | | | 2 | 3 | |
| Kansas | | 44 | | | | 48 | |
| **South Atlantic** | | 223 | | 4 | 3 | 166 | 10 |
| Delaware | | 7 | | | | 1 | |
| Maryland | | 21 | | | | 10 | |
| District of Columbia | | 10 | | | 1 | 8 | |
| Virginia | | 49 | | 1 | 1 | 51 | 4 |
| West Virginia | | 5 | | | 1 | 23 | |
| North Carolina | | 103 | | | | 39 | |
| South Carolina | | 6 | | 1 | | 5 | 3 |
| Georgia | | 10 | | 2 | | 16 | 3 |
| Florida | | [2] 12 | | | | 13 | |
| **East South Central** | | 79 | | 1 | 4 | 68 | 22 |
| Kentucky | | 18 | | | 1 | 15 | 7 |
| Tennessee | | 45 | | | 2 | 12 | 9 |
| Alabama | | 12 | | | | 33 | 5 |
| Mississippi | | 4 | | 1 | 1 | 8 | 1 |
| **West South Central** | | 150 | | | 8 | 348 | 33 |
| Arkansas | | 4 | | | 2 | 42 | 3 |
| Louisiana | | 10 | | | 3 | 6 | |
| Oklahoma | | 24 | | | | 21 | 1 |
| Texas | | 112 | | | 3 | 279 | 29 |
| **Mountain** | | 176 | | 1 | 1 | 89 | |
| Montana | | 11 | | | | 5 | |
| Idaho | | 16 | | | | 5 | |
| Wyoming | | 1 | | | | 2 | |
| Colorado | | 17 | | | | 7 | |
| New Mexico | | 8 | | | | 3 | |
| Arizona | | 9 | | | 1 | 62 | |
| Utah | | [2] 114 | | 1 | | 5 | |
| Nevada | | | | | | | |
| **Pacific** | | 292 | | | 3 | 62 | |
| Washington | (3) | (3) | (3) | (3) | (3) | (3) | (3) |
| Oregon | | 68 | | | | 19 | |
| California | | [2] 224 | | | 3 | 43 | |
| Alaska | | | | | | 2 | |
| Hawaii | | | | | | | |

[1] Including cases reported as salmonellosis.
[2] Including cases reported as streptococcal sore throat.
[3] Report not received.

# FOREIGN REPORTS

## CANADA

*Reported Cases of Certain Diseases—Week Ended January 20, 1951*

| Disease | Total | New-foundland | Prince Edward Island | Nova Scotia | New Brunswick | Quebec | Ontario | Manitoba | Saskatchewan | Alberta | British Columbia |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Brucellosis | 2 | - | - | - | - | 2 | - | - | - | - | - |
| Chickenpox | 1,486 | 2 | - | 18 | - | 315 | 605 | 80 | 135 | 109 | 222 |
| Diphtheria | 4 | - | - | - | - | 3 | - | - | 1 | - | - |
| Dysentery: | | | | | | | | | | | |
| Amebic | 1 | - | - | - | - | - | - | 1 | - | - | - |
| Bacillary | 8 | - | - | - | - | 3 | 1 | 1 | - | - | 3 |
| German measles | 237 | - | - | 25 | - | 26 | 107 | 1 | 18 | 27 | 33 |
| Influenza | 45 | - | - | 24 | - | - | 19 | 2 | - | - | - |
| Measles | 2,505 | 12 | - | 13 | 2 | 376 | 1,925 | 132 | 5 | 12 | 28 |
| Meningitis, meningococcal | 5 | - | - | - | - | 2 | 1 | - | - | - | 2 |
| Mumps | 1,786 | - | - | 11 | 27 | 319 | 476 | 57 | 209 | 240 | 447 |
| Poliomyelitis | 1 | - | - | - | - | - | - | - | - | - | 1 |
| Scarlet fever | 420 | 3 | - | - | - | 111 | 65 | 15 | 14 | 140 | 72 |
| Tuberculosis (all forms) | 165 | - | - | 4 | 17 | 87 | 18 | 14 | - | 8 | 17 |
| Typhoid and paratyphoid fever | 9 | - | - | - | - | 3 | - | - | - | 2 | 4 |
| Venereal diseases: | | | | | | | | | | | |
| Gonorrhea | 326 | 8 | - | 15 | 7 | 66 | 55 | 29 | 14 | 38 | 94 |
| Syphilis | 108 | - | - | 12 | 5 | 30 | 23 | 4 | 22 | 2 | 10 |
| Primary | 10 | - | - | - | 1 | 2 | 3 | - | 3 | - | 1 |
| Secondary | 9 | - | - | - | - | 1 | 4 | 1 | - | 2 | 1 |
| Other | 89 | - | - | 12 | 4 | 27 | 16 | 3 | 19 | - | 8 |
| Other forms | 3 | 2 | - | - | - | - | - | - | - | - | 1 |
| Whooping cough | 322 | 1 | - | 1 | 1 | 99 | 138 | 15 | 7 | 12 | 48 |

## NEW ZEALAND

*Reported Cases of Certain Diseases and Deaths, by Month: October 1950–January 1951*

| Disease | October 1950 | | November 1950 | | December 1950 | | January 1951 | |
|---|---|---|---|---|---|---|---|---|
| | Cases | Deaths | Cases | Deaths | Cases | Deaths | Cases | Deaths |
| Brucellosis | 10 | - | 2 | - | 4 | - | 8 | - |
| Diphtheria | 6 | 1 | 9 | - | 8 | 1 | 7 | - |
| Dysentery: | | | | | | | | |
| Amebic | 8 | - | 10 | - | 4 | - | 9 | - |
| Bacillary | 9 | - | 2 | - | 5 | - | 18 | 1 |
| Encephalitis, infectious | - | - | 1 | - | - | - | - | - |
| Erysipelas | 17 | - | 13 | - | 5 | - | 6 | - |
| Food poisoning | 32 | - | 3 | - | 5 | - | 31 | - |
| Hookworm | - | - | - | - | 1 | - | - | - |
| Influenza | 1 | 1 | 2 | 2 | - | - | - | - |
| Malaria | - | - | 1 | - | - | - | 2 | - |
| Meningitis, meningococcal | 6 | 1 | 10 | - | 2 | - | 9 | 2 |
| Ophthalmia neonatorum | - | - | 1 | - | - | - | - | - |
| Poliomyelitis | 3 | - | 8 | - | 2 | - | 10 | - |
| Puerperal fever | 3 | - | 5 | 1 | 4 | - | 4 | - |
| Scarlet fever | 62 | - | 69 | - | 64 | - | 46 | - |
| Tetanus | 6 | 1 | 5 | 1 | 4 | 2 | 4 | - |
| Tuberculosis (all forms) | 203 | 37 | 176 | 45 | 162 | 37 | 146 | 40 |
| Typhoid fever | 6 | 2 | 13 | 1 | 7 | - | 7 | - |

## FINLAND

*Reported Cases of Certain Diseases—December 1950*

| Disease | Cases | Disease | Cases |
|---|---|---|---|
| Diphtheria | 95 | Typhoid fever | 10 |
| Meningitis, meningococcal | 5 | Venereal diseases: | |
| Paratyphoid fever | 32 | Gonorrhea | 439 |
| Poliomyelitis | 15 | Syphilis | 35 |
| Scarlet fever | 3,183 | | |

## REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

**The following reports include only items of unusual incidence or of special interest and the occurrence of these diseases, except yellow fever, in localities which had not recently reported cases. All reports of yellow fever are published currently. A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.**

### Cholera

*Pakistan.* During the week ended January 13, 1951, four cases of cholera were reported in Dacca. For the previous week there were three cases.

*India (French).* For the week ended January 6, 1951, nine cases (four deaths) of cholera were reported in Pondicherry.

### Smallpox

*Burma.* During the week ended January 27, 1951, 18 cases of smallpox were reported in Kyaukpyu, compared with 7 and 3 cases for the weeks ended January 13 and 20, respectively.

*India.* During the week ended January 27, 1951, smallpox was reported in ports of India as follows: Calcutta 462 cases, Madras 67, Bombay 31, Tiruchirappalli 13, Mangalore 11, and Masulipatam 10.

### Typhus Fever

*Egypt.* During the week ended January 13, 1951, four cases of typhus fever were reported in Egypt.

### Yellow Fever

*Brazil.* The outbreak of jungle yellow fever in central Goiaz State is still continuing and seems to be spreading southward. For the period December 1 to January 20, 40 deaths were estimated out of a possible 200 cases.

*Colombia.* During January 1951, jungle yellow fever was reported in Colombia as follows: La Vega, North Santander Department, two cases; Vanegas, Moradales, and Campohermoso, Santander Department, one case each; and Montanita, Caqueta Commissary, one case.

*Gold Coast.* One suspected case of yellow fever was reported in Bawdua, Oda Area, on January 16, 1951.

+ + +

The printing of this publication has been approved by the Director of the Bureau of the Budget (August 10, 1949).

The PUBLIC HEALTH REPORTS, first published in 1878 under authority of an act of Congress of April 29 of that year, is issued weekly by the Public Health Service through the Division of Public Health Methods, pursuant to the following authority of law: United States Code, title 42, sections 241, 245, 247; title 44, section 220.

It contains (1) current information regarding the incidence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable disease throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

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# Public Health Reports

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IN THIS ISSUE



FEDERAL SECURITY AGENCY

PUBLIC HEALTH SERVICE

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# Public Health Reports

*Vol. 66* • MARCH 9, 1951 • *No. 10*

## Negro Mortality

### IV. Urban and Rural Mortality from Selected Causes in the North and South

By MARYLAND Y. PENNELL, M.Sc.Hyg., and MARY GOVER, D.Sc.Hyg.*

Seven important causes of death are largely responsible for the fact that Negro death rates exceed those of the white population. These seven—tuberculosis, nephritis, influenza and pneumonia, intracranial lesions of vascular origin, diseases of the heart, syphilis, and homicide—caused 514 more deaths per 100,000 persons among nonwhite than among white persons in 1940 (table 2). Several other causes also contribute to the higher mortality of the Negro. Differences in the relative importance of the several causes vary with the degree of urbanization in the Northern and Southern regions of the United States.

Death rates from selected causes are presented by size-of-city groups for the Northern and Southern sections of the Eastern and Central United States. Similar data for the West have been omitted; there, only one-third of the half a million nonwhite inhabitants are Negroes (*1*). In the North 96 percent of the nonwhite persons are Negroes; in the South, 99 percent. Thus, the mortality data for these two regions allow comparison of the Negro race with the white.

A total of 12,865,518 Negroes and 588,887 other nonwhite persons were enumerated in the United States in 1940. The distribution of the nonwhite population with respect to urbanization and region was not like that of the white population (table 1). The total population of the United States was divided in the proportions of 29, 28, and 43 percent, respectively, living in cities of 100,000 or more inhabitants, in smaller cities of 2,500 to 100,000 inhabitants, and in rural areas with no incorporated place having as many as 2,500 inhabitants (*2*). Since nine-tenths of the total population of the continental United States was white, the proportions of the white population in each size-of-city group were identical with those of the total population.

*Biostatisticians, Division of Public Health Methods, Public Health Service. This is the fourth and last in a series of studies of Negro mortality based on 1940 data assembled principally from reports of the National Office of Vital Statistics and prepared at the request of the Special Programs Branch of the Bureau of State Services, Public Health Service. This study was in progress at the time of Dr. Gover's death in August 1949.

Table 1. *Nonwhite and white population by region and population-size groups, 1940*

| Region and color | Total population | Population by size of city | | | | | |
|---|---|---|---|---|---|---|---|
| | | Number | | | Percent | | |
| | | 100,000 or more | 2,500 to 100,000 | Rural | 100,000 or more | 2,500 to 100,000 | Rural |
| United States [1] | 131,669,275 | 37,987,989 | 36,435,713 | 57,245,573 | 29 | 28 | 43 |
| Nonwhite | 13,454,405 | 3,636,348 | 2,814,531 | 7,003,526 | 27 | 21 | 52 |
| White | 118,214,870 | 34,351,641 | 33,621,182 | 50,212,047 | 29 | 28 | 43 |
| The North: [2] | | | | | | | |
| Nonwhite | 2,913,371 | 1,965,466 | 577,781 | 370,124 | 67 | 20 | 13 |
| White | 73,206,738 | 25,663,013 | 22,799,308 | 24,744,417 | 35 | 31 | 34 |
| The South: [3] | | | | | | | |
| Nonwhite | 10,007,323 | 1,480,113 | 2,151,125 | 6,376,085 | 15 | 21 | 64 |
| White | 31,658,578 | 4,587,400 | 7,071,845 | 19,999,333 | 15 | 22 | 63 |

[1] Includes the West—Mountain and Pacific geographic divisions.
[2] New England, Middle Atlantic, East North Central, and West North Central geographic divisions.
[3] South Atlantic, East South Central, and West South Central geographic divisions.

With respect to the nonwhite population, however, smaller proportions of the total were in the large and small cities (27 and 21 percent, respectively) and a considerably greater proportion (52 percent) in rural areas.

For each race the urban-rural distribution of the population in the Eastern and Central United States was the same as for the country as a whole. In the South both racial groups were largely rural and both were distributed in the same proportions among size-of-city groups. In the North, however, the white population was located almost equally in large and small cities and rural areas, while the Negroes were predominantly in large cities with only about 13 percent in rural areas. Any nonwhite-white comparison of mortality is, therefore, unaffected by degree of urbanization in the South, while in the North, account must be taken of the wide difference in the extent of urbanization of the two races.

The number of resident deaths in 1940 has been tabulated by the National Office of Vital Statistics of the Public Health Service according to State, population-size group, sex, and color for an abridged list of causes of death (*3*). Crude death rates for nonwhite and for white persons have been computed for each of 27 causes for the North and South sections of the Eastern and Central United States for each of three size-of-city groups. These rates for all ages combined have been adjusted for differences in the age distributions by the indirect method, using the total population of the United States enumerated in 1940 as the standard.

Both crude and age-adjusted death rates are given in table 2 in order to show the relative importance of various causes of death among white and nonwhite groups. Since the enumerated nonwhite population was relatively younger than the white and comprised only one-tenth of the standard population used for age adjustment, it follows

that age adjustment of the crude death rates frequently raised the nonwhite rate by a considerable amount and made only a comparatively small change in the white rate (*5*). The effect of proportionately more children in the nonwhite population was reflected in the extent to which age adjustment lowered the crude death rates for such childhood diseases as whooping cough and diphtheria. On the other hand, deaths from diseases of old age, such as diseases of the heart and cancer, showed considerably higher rates for the nonwhite population after age adjustment.

The 27 causes of death listed in table 2 account for a large majority of the total number of deaths tabulated for the calendar year 1940—84 percent of the white and 78 percent of the nonwhite deaths. An additional 4 to 5 percent of the deaths were classified as due to infancy or conditions related to childbirth. The remaining deaths were combined under the heading "all other causes" in the abridged tabulation (*3*). Other tabulations indicate that nearly 7 percent of the Negro deaths were classified as due to senility, ill-defined, and unknown causes, subgroups which accounted for less than 2 percent of the white deaths in 1940.

Table 2. *Nonwhite and white mortality from 27 causes in the Eastern and Central United States,[1] 1940: Resident deaths per 100,000 population*

| Cause of death | International List numbers, 1938 revision | Nonwhite mortality | | White mortality | | Ratio of nonwhite to white age-adjusted mortality |
|---|---|---|---|---|---|---|
| | | Age-adjusted [2] | Crude | Age-adjusted [2] | Crude | |
| Diseases of heart (all forms) | 90–95 | 354.31 | 251.01 | 290.36 | 295.50 | 1.22 |
| Nephritis | 130–132 | 178.53 | 127.41 | 75.90 | 77.46 | 2.35 |
| Intracranial lesions of vascular origin | 83 | 162.07 | 113.54 | 86.85 | 88.80 | 1.87 |
| Influenza and pneumonia (all forms) | 33, 107–109 | 145.17 | 126.02 | 63.62 | 64.12 | 2.28 |
| Tuberculosis (all forms) | 13–22 | 138.11 | 125.00 | 35.41 | 35.56 | 3.90 |
| Cancer and other malignant tumors | 45–55 | 105.21 | 77.44 | 121.91 | 124.21 | .86 |
| Accidents | 169–195 | 86.49 | 76.44 | 70.43 | 70.88 | 1.23 |
| Syphilis | 30 | 61.58 | 54.64 | 9.29 | 9.37 | 6.95 |
| Homicide | 165–168 | 35.06 | 33.77 | 3.06 | 3.05 | 11.46 |
| Diabetes mellitus | 61 | 24.88 | 17.99 | 27.66 | 28.23 | .90 |
| Hernia, intestinal obstruction | 122 | 13.68 | 11.06 | 8.63 | 8.74 | 1.59 |
| Appendicitis | 121 | 11.23 | 10.50 | 9.64 | 9.68 | 1.16 |
| Pellagra | 69 | 8.64 | 6.55 | 1.12 | 1.14 | 7.71 |
| Ulcer of stomach or duodenum | 117 | 8.08 | 6.29 | 6.44 | 6.53 | 1.25 |
| Diseases of ear, nose, and throat | 89, 104, 115 | 7.52 | 7.51 | 5.03 | 5.02 | 1.50 |
| Cirrhosis of the liver | 124 | 7.12 | 5.44 | 8.30 | 8.44 | .86 |
| Malaria | 28 | 6.21 | 5.80 | .65 | .65 | 9.55 |
| Whooping cough | 9 | 4.76 | 5.77 | 1.83 | 1.80 | 2.60 |
| Suicide | 163–164 | 4.71 | 4.01 | 14.40 | 14.52 | .33 |
| Typhoid and paratyphoid fever | 1, 2 | 3.41 | 3.27 | .87 | .87 | 3.92 |
| Biliary calculi, other diseases of gallbladder | 126, 127 | 3.15 | 2.35 | 6.31 | 6.43 | .50 |
| Acute rheumatic fever | 58 | 2.57 | 2.65 | 1.22 | 1.22 | 2.11 |
| Exophthalmic goiter | 63b | 2.30 | 1.83 | 2.87 | 2.91 | .83 |
| Diphtheria | 10 | 1.55 | 1.74 | 1.06 | 1.04 | 1.46 |
| Cerebrospinal (meningococcus) meningitis | 6 | .61 | .63 | .53 | .53 | 1.15 |
| Poliomyelitis, polioencephalitis (acute) | 36 | .47 | .53 | .79 | .78 | .59 |
| Scarlet fever | 8 | .24 | .26 | .56 | .55 | .43 |

[1] Exclusive of the Mountain and Pacific geographic divisions.
[2] Death rates specific for cause and color adjusted for age by the indirect method to the total population of the United States enumerated in 1940.

Diseases of the heart constituted the leading cause of death in 1940 among both the nonwhite and white population in the Eastern and Central United States (table 2 and fig. 1, *4*). Nonwhite mortality from the second highest cause, nephritis, was only half as great. Deaths from intracranial lesions of vascular origin, influenza and pneumonia, and tuberculosis varied but slightly in numerical importance and followed nephritis in descending order of magnitude. Cancer and other malignant tumors ranked sixth as cause of death among nonwhites but held second place among whites. Accidents, syphilis, homicide, and diabetes mellitus all ranked comparatively high in the mortality list for the nonwhite population.

The difference between the nonwhite and white mortality for each cause of death has been expressed in terms of ratios in the last column of table 2 and as the percentage excess for nonwhites over whites on the right side of figure 1. The greatest difference is apparent for homicide, the ninth leading cause of death among the nonwhite and the seventeenth cause among the white population. Mortality from homicide among the nonwhite population was about 11 times more frequent than among the white population. Causes of death which

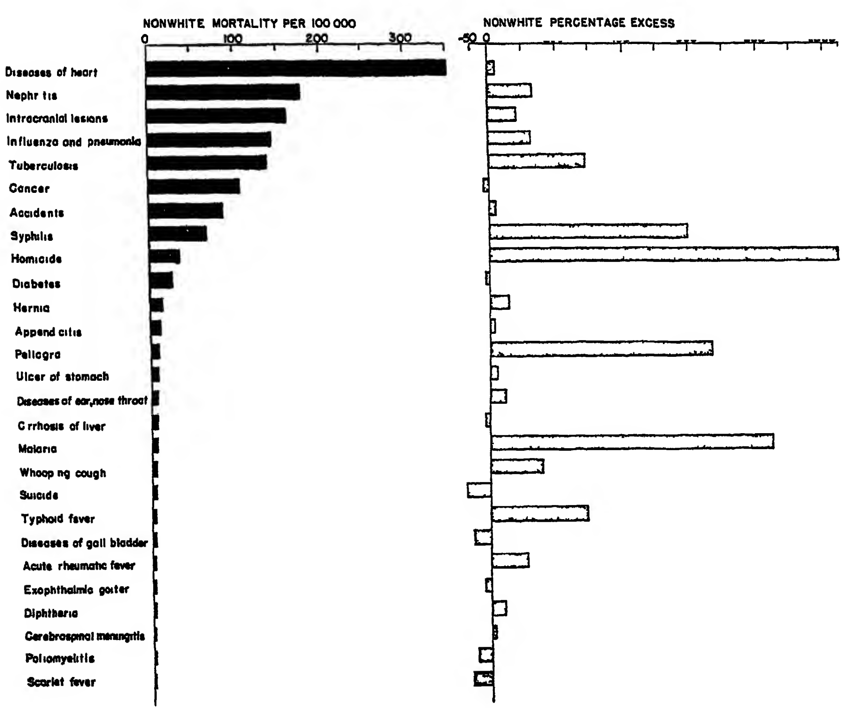


**Figure 1. Nonwhite mortality from 27 causes in the Eastern and Central United States, and the percentage excess of nonwhite over white mortality—resident age-adjusted mortality, 1940.**

occur primarily in the South, namely, malaria, pellagra, and typhoid fever, were relatively high when arrayed by this nonwhite-white ratio. There was also a relatively large nonwhite excess in mortality from syphilis and from tuberculosis. Whooping cough, nephritis, pneumonia, and rheumatic fever complete the list of the causes of death with rates more than twice as high among the nonwhite as among the white population. The nonwhite excess in mortality from heart disease was only about 20 percent.

Mortality rates from each of eight causes of death were numerically lower among the nonwhite than the white population (fig. 1). Cancer and diabetes were the highest ranking causes of death for the nonwhites among the causes that showed excess white mortality. Suicide showed the greatest percentage excess for white persons, with a mortality rate three times that of the nonwhite population.

## Ranking of 10 Leading Causes

The 10 leading causes of death among the nonwhite population in 1940, arrayed according to magnitude in the Eastern and Central United States, are shown in figure 2 for each of three population-size groups in the North and South sections. In the South the array of causes of death did not vary materially with size of city. Heart disease was always in first place; nephritis and intracranial lesions were second and third; influenza-pneumonia and tuberculosis were fourth and fifth; cancer was in sixth place in the cities and ranked seventh in rural areas.

In the North a few differences in array of nonwhite deaths were associated with population size. Heart disease was still the leading cause of death. Tuberculosis was in second place except in small cities. Cancer was relatively more important as a cause of death in large cities where it ranked third; in small cities it ranked sixth and in rural areas, seventh. Influenza-pneumonia ranked sixth in large cities and fourth in small cities and rural areas. Syphilis was in the eighth place in cities and third in rural areas.

When population groups of the same size are compared, differences between the two regions appear for the 10 highest causes of death among nonwhites. In cities of 100,000 or more persons, tuberculosis and cancer were relatively more important causes of death among nonwhite persons in the North than in the South. In the South, nephritis, intracranial lesions, and influenza-pneumonia were all more important causes of death than tuberculosis and cancer. In small cities, the 10 leading causes ranked alike in the North and South, except for the interchange of homicide and diabetes in the last two places. In rural areas tuberculosis and syphilis ranked higher in the North than in the South, while nephritis, intracranial lesions, and influenza-pneumonia ranked higher in the South than in the North.

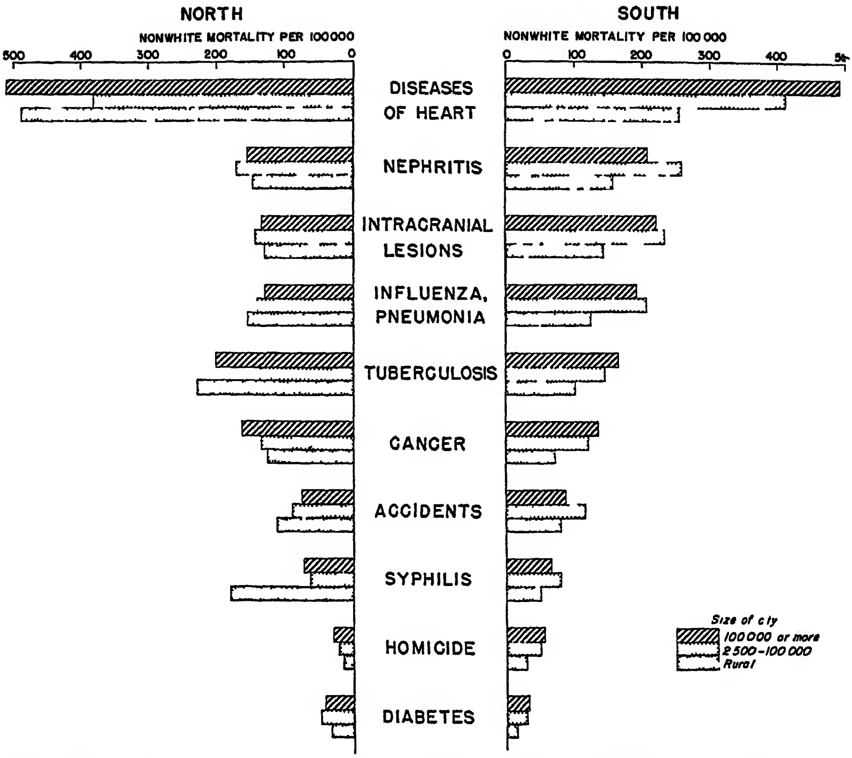


**Figure 2.** Nonwhite mortality from 10 leading causes in three population-size groups in the North and South sections of the Eastern and Central United States—resident age-adjusted mortality, 1940.

The outstanding differences, then, in the array of causes of death in relation to size of community were, in the North, a relatively high ranking for cancer in large cities and a high ranking for syphilis in rural areas. Tuberculosis ranked as a more important cause of death in the North than in the South, while nephritis and intracranial lesions ranked high in the South. It must be kept in mind that these comparisons represent the relative positions of these diseases in the arrays for the two regions and not the actual magnitude of the mortality rates

## Urban-Rural Differences

Nonwhite and white mortality rates for the 27 causes of death are given in table 3 for three population-size groups in the North and South sections of the Eastern and Central United States. The general tendency was for mortality rates to decrease with decrease in size of community, as was notably the case for nonwhite mortality from heart disease, cancer, diabetes, and homicide. With respect to some other causes, mortality rates in large cities may be lower than in small

cities, although all urban mortality is higher than rural; rates for nephritis and intracranial lesions were of this pattern.

In the South nonwhite rates for each of the 10 leading causes of death all showed rural mortality in the lowest place, but in the North the rural rates for several causes were higher than those for larger communities (fig. 2). Unusually high rates in Northern rural areas were observed for influenza-pneumonia, tuberculosis, accidents, and syphilis. An analysis of each of the 27 causes of death among nonwhite persons showed that the rural rates were in lowest place 22 times in the South but only 12 times in the North. In the North rural rates ranked first 11 times (table 3).

Factors which influence mortality differences between rural areas and small cities are the failure to allocate deaths properly to the place of residence and the incompleteness of death registration. Also, the reporting of multiple causes of death by physicians occurs more frequently in urban areas, particularly near large medical centers. The details of diagnosis may be less accurately reported in rural areas.

The ratio of the nonwhite to white mortality also shows the differences associated with community size. In the South the nonwhite percentage excess of mortality was relatively smaller in rural areas. The reverse was apparent in the North.

## North-South Comparisons

The percentage excess of mortality in the North over the South also brings out the difference in Northern rural mortality. Comparison of Northern and Southern rates for the three population-size groups are given in table 4 for all 27 causes and in figure 3 for the 10 leading causes.

For each cause of death illustrated in figure 3, the percentage by which the nonwhite rates for the North exceeded those for the South was greater for rural areas than for the urban communities. All but 2 of the 10 leading causes of death shown in figure 3 were associated with old age, the exceptions being accidents and homicide. An examination of the other causes of death indicates that it was chiefly the diseases characteristic of old age that exhibited excessive nonwhite mortality in Northern rural areas.

The observed excess in rural areas of the North has been attributed by many writers largely to the inaccurate or deficient death registration in the rural South. A special tabulation of nonwhite deaths classified as due to senility, ill-defined, and unknown causes of death has been made by the National Office of Vital Statistics. One-half of this subgroup rate has been used as most indicative of death from old age and has been added to the sum of mortality from the eight old-age causes of death in the crude death rates which follow.

Table 3. *Nonwhite and white mortality from 27 causes in the North and South sections of the Eastern and Central United States, by population-size groups: Resident age-adjusted mortality per 100,000 population, 1940*

| Cause of death | Nonwhite mortality by size of city | | | White mortality by size of city | | | Ratio of nonwhite to white mortality by size of city | | |
|---|---|---|---|---|---|---|---|---|---|
| | 100,000 or more | 2,500 to 100,000 | Rural | 100,000 or more | 2,500 to 100,000 | Rural | 100,000 or more | 2,500 to 100,000 | Rural |
| | The North [1] | | | | | | | | |
| Diseases of heart (all forms) | 509.50 | 380.78 | 409.27 | 361.22 | 302.39 | 263.85 | 1.41 | 1.26 | 1.55 |
| Nephritis | 153.86 | 171.44 | 146.28 | 69.09 | 75.43 | 69.93 | 2.23 | 2.27 | 2.09 |
| Intracranial lesions of vascular origin | 133.44 | 142.36 | 129.80 | 76.15 | 90.43 | 88.17 | 1.75 | 1.57 | 1.47 |
| Influenza and pneumonia (all forms) | 129.12 | 140.15 | 154.43 | 56.45 | 54.29 | 58.87 | 2.29 | 2.58 | 2.62 |
| Tuberculosis (all forms) | 200.26 | 136.30 | 228.32 | 36.60 | 28.37 | 30.56 | 5.47 | 4.80 | 7.47 |
| Cancer and other malignant tumors | 161.57 | 133.83 | 124.98 | 151.56 | 131.18 | 109.96 | 1.07 | 1.02 | 1.14 |
| Accidents | 74.89 | 90.10 | 110.90 | 64.23 | 69.86 | 72.07 | 1.17 | 1.29 | 1.54 |
| Syphilis | 71.52 | 61.94 | 179.28 | 9.94 | 8.40 | 10.04 | 7.20 | 7.37 | 17.86 |
| Homicide | 29.81 | 23.03 | 15.87 | 2.46 | 1.57 | 1.58 | 12.12 | 14.67 | 10.04 |
| Diabetes mellitus | 42.46 | 46.69 | 32.21 | 36.88 | 31.28 | 24.29 | 1.15 | 1.49 | 1.33 |
| Hernia, intestinal obstruction | 14.50 | 16.70 | 9.30 | 9.22 | 9.20 | 8.34 | 1.57 | 1.82 | 1.12 |
| Appendicitis | 11.32 | 14.00 | 11.00 | 9.62 | 10.98 | 9.37 | 1.18 | 1.28 | 1.17 |
| Pellagra | .71 | 1.34 | .64 | .16 | .14 | .17 | 4.44 | 9.57 | 3.76 |
| Ulcer of stomach or duodenum | 8.36 | 9.13 | 8.03 | 7.45 | 6.97 | 5.41 | 1.12 | 1.31 | 1.48 |
| Diseases of ear, nose, and throat | 6.86 | 9.36 | 6.33 | 4.65 | 5.19 | 4.90 | 1.48 | 1.80 | 1.29 |
| Cirrhosis of the liver | 9.73 | 10.17 | 5.91 | 11.98 | 8.52 | 6.16 | .81 | 1.19 | .96 |
| Malaria | .66 | 1.46 | 3.29 | .11 | .09 | .17 | 6.00 | 16.22 | 19.35 |
| Whooping cough | 2 45 | 5.25 | 5.92 | .72 | 1.40 | 1.62 | 3.40 | 3.75 | 3.65 |
| Suicide | 7.13 | 6.74 | 8.97 | 14.65 | 14.22 | 15.07 | .49 | .47 | .60 |
| Typhoid and paratyphoid fever | .89 | 2.74 | 3.84 | .30 | .49 | .64 | 2.97 | 5.59 | 6.00 |
| Biliary calculi, other diseases of gallbladder | 5.06 | 5.19 | 6.27 | 7.34 | 7.33 | 5.79 | .69 | .71 | 1.08 |
| Acute rheumatic fever | 2.37 | 3.67 | 3.27 | 1.36 | 1.39 | 1.09 | 1.74 | 2.64 | 3.00 |
| Exophthalmic goiter | 3.50 | 4.45 | 5.56 | 3.17 | 3.44 | 3.23 | 1.10 | 1.29 | 1.72 |
| Diphtheria | .82 | .89 | 2.77 | .44 | .63 | .62 | 1.86 | 1.41 | 4.47 |
| Cerebrospinal (meningococcus) meningitis | .47 | 1.58 | 1.05 | .38 | .63 | .38 | 1.24 | 2.51 | 2.76 |
| Poliomeylitis, polioencephalitis (acute) | .45 | 1.04 | .78 | .45 | .97 | 1.03 | 1.00 | 1.07 | .76 |
| Scarlet fever | .61 | 1.27 | .00 | .48 | .55 | .79 | 1.27 | 2.31 | ------ |
| | The South [2] | | | | | | | | |
| Diseases of heart (all forms) | 491.40 | 412.04 | 252.59 | 351.70 | 284.97 | 195.21 | 1.40 | 1.45 | 1.29 |
| Nephritis | 206.70 | 258.03 | 155.57 | 90.92 | 100.76 | 84.58 | 2.27 | 2.56 | 1.84 |
| Intracranial lesions of vascular origin | 219.68 | 231.95 | 140.04 | 88.58 | 104.96 | 88.10 | 2.48 | 2.21 | 1.59 |
| Influenza and pneumonia (all forms) | 189.99 | 205.27 | 122.80 | 73.40 | 88.12 | 80.89 | 2.59 | 2.33 | 1.52 |
| Tuberculosis (all forms) | 164.42 | 143.96 | 99.16 | 45.70 | 49.04 | 41.56 | 3 60 | 2.94 | 2.39 |
| Cancer and other malignant tumors | 133.40 | 119.63 | 70.48 | 131.45 | 118.78 | 79.12 | 1.01 | 1.01 | .89 |
| Accidents | 85.86 | 114.93 | 79.09 | 75.41 | 93.93 | 67.85 | 1.14 | 1.22 | 1.17 |
| Syphilis | 66.16 | 79.09 | 48.68 | 11.22 | 13.66 | 6.16 | 5.90 | 5.79 | 7.90 |
| Homicide | 54.40 | 50.41 | 27.64 | 5.31 | 6.03 | 5.94 | 10.24 | 8.36 | 4.65 |
| Diabetes mellitus | 31.22 | 28.38 | 14.15 | 28.32 | 23.94 | 14.72 | 1.10 | 1.19 | .96 |
| Hernia, intestinal obstruction | 21.60 | 18.50 | 10.05 | 10.00 | 10.24 | 6.46 | 2.16 | 1.81 | 1.56 |
| Appendicitis | 15.46 | 17.18 | 7.92 | 8.62 | 13.00 | 7.40 | 1.79 | 1.32 | 1.07 |
| Pellagra | 3.82 | 13.75 | 11.72 | 1.52 | 3.75 | 4.64 | 2.51 | 3.67 | 2.53 |
| Ulcer of stomach or duodenum | 11.85 | 11.86 | 5.41 | 7.06 | 7.33 | 5.12 | 1.68 | 1.62 | 1.06 |
| Diseases of ear, nose, and throat | 7.51 | 9.07 | 7.17 | 4.84 | 7.52 | 4.68 | 1.55 | 1.21 | 1.53 |
| Cirrhosis of the liver | 7.63 | 10.48 | 4.57 | 11.28 | 8.82 | 4.44 | .68 | 1.19 | 1.03 |
| Malaria | 1.03 | 5.56 | 9.55 | .42 | 1.61 | 2.36 | 2.45 | 3.45 | 4.05 |
| Whooping cough | 5.85 | 5.65 | 4.77 | 2.65 | 3.16 | 2.75 | 2.21 | 1.79 | 1.73 |
| Suicide | 4.98 | 5.01 | 3.00 | 18.31 | 16.82 | 11.18 | .27 | .30 | .27 |
| Typhoid and paratyphoid fever | 1.92 | 4.61 | 4.13 | .77 | 1.93 | 1.96 | 2.49 | 2.39 | 2.11 |
| Biliary calculi, other diseases of gallbladder | 3.57 | 2.90 | 2.04 | 6.48 | 6.36 | 3.92 | .55 | .46 | .52 |
| Acute rheumatic fever | 3.45 | 2.85 | 2.26 | 1.27 | 1.03 | 1.10 | 2.72 | 2.77 | 2.05 |
| Exophthalmic goiter | 2.02 | 3.02 | 1.37 | 2.37 | 2.10 | 1.40 | .85 | 1.44 | .98 |
| Diphtheria | 1.11 | 2.38 | 1.56 | .95 | 2.24 | 2.06 | 1.17 | 1.06 | .76 |
| Cerebrospinal (meningococcus) meningitis | .73 | .88 | .53 | .55 | .83 | .66 | 1.33 | 1.06 | .80 |
| Poliomyelitis, polioencephalitis (acute) | .26 | .52 | .46 | .57 | .78 | .75 | .46 | .67 | .61 |
| Scarlet fever | .25 | .17 | .12 | .32 | .52 | .43 | .78 | .33 | .28 |

[1] The North: New England, Middle Atlantic, East North Central, and West North Central geographic divisions.
[2] The South: South Atlantic, East South Central, and West South Central geographic divisions.

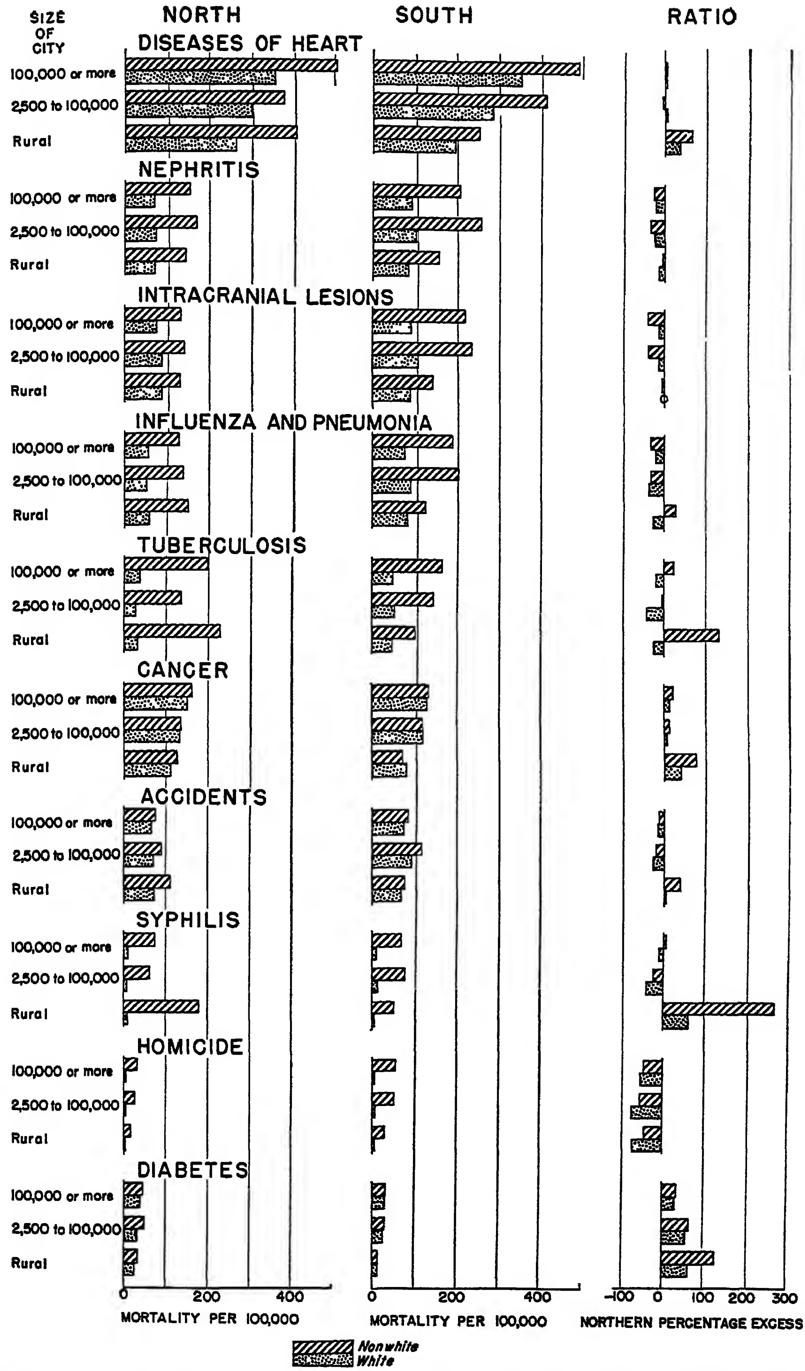


Figure 3. Nonwhite and white mortality from 10 leading causes in three population-size groups in the North and South sections of the Eastern and Central United States, and the percentage excess of North over South mortality—resident age-adjusted mortality, 1940.

| | Population-size Group | | |
|---|---|---|---|
| | 100,000 and over | 2,500 to 100,000 | Rura |
| Northern mortality per 100,000: | | | |
| 8 old-age causes | 1044. 38 | 1062. 85 | 1312. 26 |
| Ill-defined and senility | 5. 75 | 8. 83 | 30. 93 |
| Total | 1050. 13 | 1071. 68 | 1343. 19 |
| Southern mortality per 100,000: | | | |
| 8 old-age causes | 1094. 10 | 1125. 28 | 681. 68 |
| Ill-defined and senility | 28. 85 | 47. 49 | 83. 52 |
| Total | 1122. 95 | 1172. 77 | 765. 20 |

The above data add evidence to the findings that nonwhite mortality rates were relatively low in large cities and in Southern rural areas, and high in rural areas of the North. The causes responsible for the high Northern rural mortality rates were largely the diseases characteristic of persons in the older age brackets.

Table 4. *Relative differences in mortality from 27 causes between the North and South sections of the Eastern and Central United States, by population-size groups: Nonwhite and white resident age-adjusted mortality per 100,000 population, 1940*

| Cause of death | Ratio of North to South mortality | | | | | |
|---|---|---|---|---|---|---|
| | Nonwhite mortality by size of city | | | White mortality by size of city | | |
| | 100,000 or more | 2,500 to 100,000 | Rural | 100,000 or more | 2,500 to 100,000 | Rural |
| Diseases of heart (all forms) | 1. 04 | 0. 92 | 1. 62 | 1. 03 | 1. 06 | 1. 35 |
| Nephritis | . 74 | . 66 | . 94 | . 76 | . 75 | . 83 |
| Intracranial lesions of vascular origin | . 61 | . 61 | . 93 | . 86 | . 86 | 1. 00 |
| Influenza and pneumonia (all forms) | . 68 | . 68 | 1. 26 | . 77 | . 62 | . 73 |
| Tuberculosis (all forms) | 1. 22 | . 95 | 2. 30 | . 80 | . 58 | . 74 |
| Cancer and other malignant tumors | 1. 21 | 1. 12 | 1. 77 | 1. 15 | 1. 10 | 1. 39 |
| Accidents | . 87 | . 78 | 1. 40 | . 85 | . 74 | 1. 06 |
| Syphilis | 1. 08 | . 78 | 3. 68 | . 89 | . 61 | 1. 63 |
| Homicide | . 55 | . 46 | . 57 | . 46 | . 26 | . 27 |
| Diabetes mellitus | 1. 36 | 1. 65 | 2. 28 | 1. 30 | 1. 31 | 1. 65 |
| Hernia, intestinal obstruction | . 67 | . 90 | . 93 | . 92 | . 90 | 1. 29 |
| Appendicitis | . 73 | . 81 | 1. 30 | 1. 12 | . 84 | 1. 27 |
| Pellagra | . 19 | . 10 | . 05 | . 11 | . 04 | . 04 |
| Ulcer of stomach or duodenum | . 71 | . 77 | 1. 48 | 1. 06 | . 95 | 1. 06 |
| Diseases of ear, nose, and throat | . 91 | 1. 03 | . 88 | . 96 | . 69 | 1. 05 |
| Cirrhosis of the liver | 1. 28 | . 97 | 1. 29 | 1. 06 | . 97 | 1. 39 |
| Malaria | . 64 | . 26 | . 34 | . 26 | . 06 | . 07 |
| Whooping cough | . 42 | . 93 | 1. 24 | . 27 | . 41 | . 59 |
| Suicide | 1. 43 | 1. 35 | 2. 99 | . 80 | . 85 | 1. 35 |
| Typhoid and paratyphoid fever | . 46 | . 59 | . 93 | . 39 | . 25 | . 33 |
| Biliary calculi, other diseases of gall-bladder | 1. 42 | 1. 79 | 3. 07 | 1. 13 | 1. 15 | 1. 48 |
| Acute rheumatic fever | . 69 | 1. 29 | 1. 45 | 1. 07 | 1. 35 | . 99 |
| Exophthalmic goiter | 1. 73 | 1. 47 | 4. 06 | 1. 34 | 1. 64 | 2. 31 |
| Diphtheria | . 74 | . 37 | 1. 78 | . 46 | . 28 | . 30 |
| Cerebrospinal (meningococcus) meningitis | . 64 | 1. 80 | 1. 98 | . 69 | . 76 | . 58 |
| Poliomyelitis, polioencephalitis (acute) | 1. 73 | 2. 00 | 1. 70 | . 79 | 1. 24 | 1. 37 |
| Scarlet fever | 2. 44 | 7. 47 | ---------- | 1. 50 | 1. 06 | 1. 84 |

## Summary

Death rates from selected causes among nonwhite and white persons are presented for three population-size groups in the Northern and Southern regions of the Eastern and Central United States. The

27 causes discussed in the paper accounted for a large majority of the deaths tabulated in 1940.

The 10 leading causes of nonwhite deaths were: diseases of the heart, nephritis, intracranial lesions of vascular origin, influenza and pneumonia, tuberculosis, cancer and other malignant tumors, accidents, syphilis, homicide, and diabetes mellitus. Among the diseases that showed excess white mortality, cancer and diabetes were the highest ranking causes of death among nonwhite persons. Among the 27 causes, homicide showed the greatest percentage excess for nonwhite persons, and suicide for white persons

In the South the array of the 10 leading causes of nonwhite deaths did not vary materially by size of city. In the North, however, tuberculosis and cancer were relatively more important causes of death in large cities, and syphilis in rural areas.

Nonwhite mortality rates were relatively low in large cities and in Southern rural areas and were high in rural areas of the North. The causes of death occurring mainly in old age were those that exhibited excessive nonwhite mortality rates in Northern rural areas.

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# Health Department Assistance in Nutrition Education in Elementary and Secondary Schools

By Floy Eugenia Whitehead, M.S.* and Fredrick J. Stare, M.D.†

Who in public health is concerned with nutrition education in the public schools, and what specifically is involved in contributions to a genuinely effective program?

It seems necessary that both school and public health personnel arrive at and accept some clearly defined purpose of nutrition education if they are to act with direction and without misunderstanding. Once they have accepted and understood their purpose they have rather definite ideas about what they may do, for (in educational realms at least) purposes determine scope, method, and activity. They also give direction to evaluation.

When an approach is made with the idea of setting up goals or purposes once and for all, the outcome is apt to be extremely limited. However, when the approach is made with the understanding that the goals formulated are subject to revision as need arises, the outcome is potentially rich. Sometimes it is helpful if general objectives which relate to both the elementary and secondary schools are developed with long-term implications. It is within specific objectives for specific age groups that one would hope to find the greater variation and the shorter-term implications.

For example, a general purpose may be to improve the nutritional status of children and teachers. This is a long-term, over-all purpose involving both behavior and fact. The extent to which the nutrition-education program contributes evidence of moving toward that purpose is the extent to which evaluation may be most genuine. A specific purpose, usually related to a general purpose by inference or by repetition in part, may be to guide fourth-grade children to appraise their food habits and to plan and carry out ways of making them better. This is a relatively short-term purpose. Progress toward it may be measured at short-term intervals. It is specific for fourth-grade children and when it has been reached, some progress has been made toward accomplishing the general purpose mentioned.[1]

Once purposes of nutrition education are formulated (this may require several meetings and considerable revision), activities will begin

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[1] For examples of purposes, objectives, goals, activities, and evaluation devices and procedures see references *1*, *2*, *3*, and *4*.

to fill in a program with efficient and gratifying outcomes—especially when that program is planned on the basis of needs of the children and teachers concerned.

Some of the "assistance" which is now being given by health departments to nutrition education in school programs includes services of: (1) nutritionists, (2) nurses, (3) sanitary engineers, (4) medical-social workers, (5) dentists and dental hygienists, (6) health educators, (7) laboratories, and (8) physicians. Of course, many areas may have none or only some of the services to offer. In a relatively few metropolitan areas may be found all of the services. Regardless of the public health personnel available, the services of the laboratories may nearly always be obtained through some medium.

Services of the eight groups, as directly related to nutrition education in schools, are described here as though they were all available from either local, district, or State health departments.

*Public Health Nutritionists.*[2] Service given by the public health nutritionists to school programs is only one of many in the total nutrition program, yet it is a very important one and usually stems from the role of a consultant. School people look to nutritionists for guidance in interpreting nutrition to teachers, to parents, and to school-lunch personnel. This service may take effect through participation in teacher-training activities, such as conferences, workshops, and group discussions in both preservice and inservice teacher-training programs. The nutritionist is regarded as a resource person and as a technical adviser who helps school personnel keep up to date on nutrition information, films, books, pamphlets, and effective ways of using these and other media in nutrition education. Sometimes the nutritionist works directly with children (and their parents) who have special nutritional problems, such as overweight, underweight, and diabetes. She rarely "takes over" a class for a teacher but rather works with her in planning learning experiences or developmental tasks for children within classrooms and school lunch rooms. She constantly emphasizes nutrition as being essential to better health. She must help school people develop an "ideal" of a well-nourished child (*5*). She must also help them to realize fully that no single factor is of more importance to a child's well-being than is nutrition (*6*).

*Public Health Nurses.* Assistance which public health nurses give to nutrition education in school programs should be complementary to that given by the nutritionist. Nurses who are well aware of the purpose of the program can give invaluable service by "carrying the same message" as that of the nutritionist into homes they visit, into well-child conferences, preschool conferences, and by being alert to nutrition teaching opportunities to interpret relationships between

[2] See Pub Health Rep 65: 411–445 (1950) for an interpretation of Nutrition Programs in State Health Departments.

nutrition and growth, structure of bones and teeth, resistance to infection, capacity to work, attainment of full physical vigor, and the enjoyment of healthier living. They, like all other workers in public health, give special impetus to nutrition education when they are able to teach children by precept and example that nutrition is important. An overweight nurse is hardly an asset to a nutrition education program. This holds for all school and public health personnel.

*Sanitary Engineers.* These representatives of the health department usually assist school principals in the work of safeguarding the water, milk, and other food supplies They also conduct classes for food handlers. They serve nutrition education when they prepare and interpret materials relative to their activities, which teachers may use in classrooms. An interpretation of the State sanitary code in language the fifth-grader can understand will help in extending the school's nutrition-education work. When sanitary engineers take time to conduct field trips into community "water works," dairies, and market places with high school age boys and girls, they make a valuable contribution to nutrition education. The assistance of this group has been widely recognized as it has contributed directly to helping provide sanitary school lunchrooms which are the "laboratories" for nutrition education.

*Public Health Dentists and Dental Hygienists.* Perhaps this group gives more assistance to nutrition education than is generally realized. Because they, with the help of private dentists, reach almost every child in school, their opportunities to assist are almost as frequent as that of classroom teachers. When a child sits in the dental chair and hears the dentist or dental hygienist say the same things about foods which are essential to building strong bones and teeth and healthy gums that were said at school, he is impressed to such an extent that he often returns to his classmates and says, "That dentist told me the same things about what to eat as we talked about in class!" When teacher, dentist, nurse, and others all present the same nutritional messages to children, they remember them and are likely to practice them.

*Medical-Social Workers.* Although the services of these workers are, at present, mostly available at State and district levels, and the shortage of personnel limits their work with other agencies, they assist appreciably with nutrition education in schools. When medical-social workers are brought into teacher-supervisor conferences or workshops for the purpose of interpreting some of the socioeconomic and emotional factors involved in family relationships, as well as in an individual child's feeding problems, the result is a better understanding on the part of the teacher as to how she can guide pupils through some of their nutritional problems. It may take the medical-social worker's analysis to unravel many factors associated with help-

ing the diabetic child adjust to school. The social worker might be the connecting link between school and home which is necessary for the full success of the nutrition education program at school. She assists by giving consultant and educational guidance to parents as well as teachers when she helps them to see in full that children do not live by bread alone. The nutrition-education program which seeks only to impart knowledge has little effect upon children's food habits. Often it is the medical-social worker who can interpret the emotional factors associated with food acceptance or rejection which become indices to nutrition education.

*Public Health Educators.* These workers contribute most to nutrition education in schools when they extend the same emphasis made by the nutritionist. They, too, are resource people with potential assistance to schools which is rapidly becoming more fully realized. They are especially able to give information regarding such media as films, posters, exhibits, and ways and means of extending the school's nutrition-education work into the community—where it must go if all its purposes are completely achieved. Parents, as well as children, have roles to play in the school's nutrition-education work, and health educators are prepared to create situations in which parents, as well as teachers, and all representatives of the health department may work effectively. Usually this is done through school health committee organizations as a part of a health council. The word "organization" in this sense becomes a verb and denotes a continuous process. Herein health educators become coordinators of services and assistance in nutrition education at school.

*Public Health Laboratories.* Technicians in this group can assist nutrition education in schools by interpreting their services to teachers (often through sanitary engineers and nurses). They would assist very much by helping prepare simple materials to be used in instruction units, including such topics as: "Is Our Milk Safe?" "How Pure Is Our Water?" "Do We Have Adequate Sanitary Conditions In Our Lunchrooms?" "How Well Must a Food-Handler Be?" Although assistance from laboratories is usually given indirectly, it is nonetheless important. Field trips to public health laboratories are excellent learning experiences for school people. Such trips offer educational opportunities for high-school-age groups which may be a very appropriate part of a unit in nutrition education.

*Public Health Physicians.* This group, especially when trained in nutrition, becomes the fountainhead of assistance from health departments to school programs in nutrition education. They assist by working with school personnel and others concerned in developing policies which give authority and direction to programs. They contribute by helping school people keep informed about assistance, both consultative and in the form of grants-in-aid, available from Federal


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agencies. Health officers and staff assist most when they plan and work with, as well as for, school personnel in nutrition education. The physician who works with nutrition problems is in a unique position to interpret the community's nutritional needs upon which the school's nutrition-education program should be built. Nutrition education in the schools offers educational opportunities unequaled by any other single program within the health department.

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# Rickettsialpox Case Due to Laboratory Infection

By Marvin H. Sleisenger, M.D.,* Edward S. Murray, M.D.,† and
Sidney Cohen, M.D.*

Laboratory infections are an important hazard to personnel working with certain rickettsiae, such as the agents of Q fever and typhus fever. The risk of laboratory infection in persons working with *Rickettsia akari*, the agent of rickettsialpox, has not been evaluated. Rose (*1*) cites without detail one case of the disease contracted in his laboratory. In this paper, we are reporting a serologically proved case of rickettsialpox acquired in the laboratory. These observations indicate that laboratory work with the agent of rickettsialpox is not without risk of infection.

## CASE REPORT

D.L.S., a 22-year-old married, German-born, laboratory technician, entered the Beth Israel Hospital for the first time December 5, 1949, with a complaint of chills and malaise.

The patient was apparently well until November 30, 1949, when she developed mild coryza and sore throat associated with slight generalized myalgia. The following day she was nauseated and had vague epigastric discomfort. The coryza and sore throat decreased and she was about to return to work when, on December 3, 1949,[1] she had a rather sudden onset of backache and severe frontal headache. At this time, she felt somewhat feverish and complained of marked malaise, anorexia, and weakness. The following morning her oral temperature was 101° F. falling to 100° F. by evening. Her headache increased in severity, and nausea returned. During the night of December 4–5, the patient had several chills with a rise in temperature to 101° F. She was admitted to the hospital the following morning.

Past history revealed an appendectomy at the age of 6 and bilateral otitis media at the age of 12. In 1946, she had recurrent attacks of abdominal pain and mild diarrhea. Amebiasis was diagnosed and treated with unknown medication. Repeated stool examinations since that time were negative. She had no further abdominal complaints or diarrhea.

The patient was employed as a technician in the rickettsial disease laboratory of the Harvard University School of Public Health. September 7, September 14, and November 2, 1949, she was inoculated with separate 0.5 cc. doses of vaccine against epidemic and murine typhus and Rocky Mountain spotted fever. Vaccination against rickettsialpox was not performed. From October 1, 1949, until the onset of the present illness, she participated in experiments with strains of murine and epidemic typhus, Rocky Mountain spotted fever, Canadian vole

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[1] Statements as to day of disease are based on the assumption that December 3, 1949, was the first day of illness due to rickettsialpox.

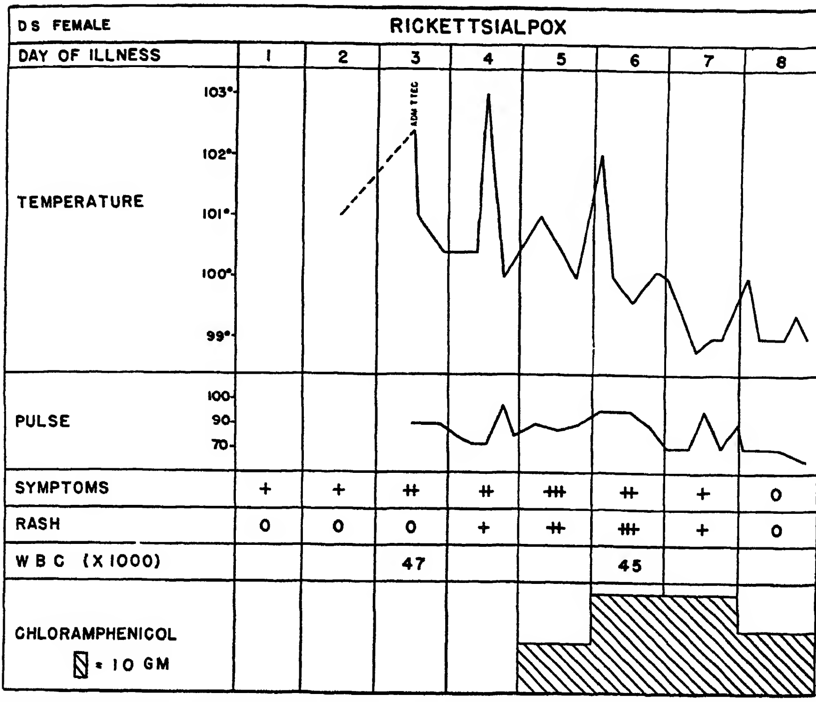
agent, and rickettsialpox. There was no recognized accident or break in technique in the laboratory which would have resulted in direct contact with virulent rickettsiae. However, on November 16 and 21, 1949, the patient manipulated yolk-sac membranes of chick embryos infected with the MK strain of rickettsialpox and made serial dilutions for the inoculation of mice on November 22, 1949.

Physical examination: The patient did not appear very ill. The rectal temperature was 102.4° F., the pulse 88, the respirations 20, and the blood pressure 105/70. No cutaneous eruption or enanthem was noted. The liver and spleen were not palpable. There was mild tenderness over the upper sacral and lower lumbar vertebrae.

During the first four hospital days, December 5–9, the rectal temperature ranged between 100° F. and 103° F., the latter temperature occurring after a short shaking chill. Generalized muscular pains, most marked in the lumbar region, moderate frontal headache, slight photophobia, nausea, and anorexia persisted. On December 6, the fourth day of the illness, three small, red macules were noted on the face, including one on the left eyelid. The following morning, about 8 or 10 pink macules 4 to 6 mm. in diameter were noted scattered over the trunk and about the same number of maculopapules on the extremities and face. Several of the papular lesions had a tiny, whitish point at the apex. The lesion on the left eyelid was definitely vesicular. The same evening, the end of the fifth day of illness, treatment with chloramphenicol was instituted; one gram was given by mouth every 6 hours. During the following day, no striking change was noted. Indeed, more of the eruption was vesicular, and a few papular, erythematous lesions, 2 to 4 mm. in diameter, were noted on the soft palate and buccal mucosa. However, after 36 hours of treatment the temperature dropped to normal where it remained except for a single rise to 100° F. By late evening of the seventh day of illness the patient felt well, and all symptoms, except for some mild blurring of vision, had disappeared. The rash quickly faded and was barely visible 3 days later when she was discharged from the hospital. She returned to work completely well on December 19, 1949. The clinical features are summarized on the chart.

## Laboratory Data

An uncatheterized specimen of urine obtained December 5 contained 8 to 10 white cells per high power field. Urinalysis on December 9 was negative. The hemoglobin on admission was 12.7 grams and the red blood count 4.3 million. White blood counts on two occasions were 4,500 and 4,700. An initial blood smear showed 60 percent mature polymorphonuclear leukocytes, 9 percent band forms, 22 percent lymphocytes, and 9 percent monocytes. Another blood smear at the time of discharge showed 40 percent mature polymorphonuclear leukocytes, 19 percent band forms, 30 percent lymphocytes, and 11 percent monocytes. Three stool examinations disclosed no ova or parasites. Blood nonprotein nitrogen was 19 milligrams percent. The Hinton test was negative. Serum agglutinins were found in a dilution of 1–40 for typhoid O, typhoid H, and paratyphoid A. Heterophile agglutination test with sheep red blood cells was negative. Culture of the nose and throat showed no pathogenic organisms. The corrected blood sedimentation rate was 0.25 millimeter per minute (Rourke-Ernstene). Two blood cultures were negative.




Clinical features of rickettsialpox case. The final 2 days of normal temperature in the hospital are not recorded.

Blood drawn on the fifth day of illness was inoculated into eight mice. Six of these, having shown no sign of disease, were subsequently challenged with *Rickettsia akari* and died. Two mice were sacrificed 10 days after inoculation with no evidence of disease. Blind serial passages of brain material were carried through four passages in mice with negative results. A second specimen of blood drawn on the eighth day of illness was similarly carried through three passages in mice also with negative results. Complement fixation tests with rickettsial antigens and agglutination tests with *Proteus* antigens are summarized in the table. Antibody titers against the antigens of rickettsialpox and Rocky Mountain spotted fever rose from 0 to 1:80 by the twelfth day of illness. Concomitantly, titers against the antigens of typhus fever rose from 1:40 to 1:160 in the case of epidemic typhus antigen and from 1:20 to 1:40 in the case of murine typhus antigen. Agglutinations with *Proteus* OX-19, OX-2, OX-K were negative during and following the illness.

## Discussion

The clinical and laboratory characteristics of rickettsialpox as reviewed elsewhere (*2*) are fairly accurately repeated in the history re-

*Tests on serum specimens of patient D. L. S.*

| Date blood drawn | Day of disease | Complement fixation* | | | | | Weil-Felix OX* | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Epidemic typhus | Murine typhus | Q fever | Rocky Mountain spotted fever | Rickettsialpox | 19 | 2 | K |
| Dec. 4, 1949 | 2 | 40 | 20 | 0 | 0 | 0 | 0 | 0 | 0 |
| Dec. 6, 1949 | 4 | 20 | 10 | 0 | 0 | 0 | 0 | 0 | 0 |
| Dec. 8, 1949 | 6 | ---------- | ---------- | ---------- | 0 | 0 | ------ | ------ | ------ |
| Dec. 9, 1949 | 7 | ---------- | ---------- | ---------- | 10 | 0 | ------ | ------ | ------ |
| Dec. 14, 1949 | 12 | 80 | 40 | 0 | 80 | 80 | 0 | 0 | 0 |
| Dec. 19, 1949 | 17 | 160 | 40 | 0 | 80 | 80 | 0 | 0 | 0 |
| Dec. 29, 1949 | 27 | 160 | 40 | 0 | 80 | 80 | 0 | 0 | 0 |
| Feb. 8, 1950 | 68 | ---------- | ---------- | ---------- | 80 | 80 | ------ | ------ | ------ |
| Apr. 24, 1950 | 143 | 160 | 40 | ---------- | ---------- | ---------- | 0 | 0 | 0 |

*The figures in these columns are the reciprocals of the final serum dilutions.

NOTE: These tests were performed by Miss Avis Ofstrock. We are indebted to Dr. Herald R. Cox of Lederle Laboratories for the antigens used in the complement fixation tests.

ported above. The lack of a primary lesion was an atypical feature. Although 5 to 10 percent (*1*, *3*) of naturally acquired cases do not show a primary lesion, its absence in this instance may be due to the unnatural mode of infection.

It is our surmise that the agent gained access to the patient via the respiratory or conjunctival mucous membranes during the manipulation of the infected yolk-sac material. Infection from mites is unlikely, since colonies of these arthropods were not present in the laboratory during this period. No evidence of exposure of the patient to house mice was found. Her residence showed no signs of infestation with mice. No house mice have been caught in the laboratory although traps have been set.

The onset of the illness in this case was not sharply defined. Malaise and coryza were present for several days before the onset of feverishness, severe headache, and backache. This preliminary illness appeared to have been a common cold. However, it cannot, with certainty, be dissociated from the subsequent rickettsialpox. The interval between the onset of symptoms and the eruption of rickettsialpox is sufficiently variable as to be of no definitive value in settling this point. The precise duration of the illness in this case must therefore remain uncertain.

Oral lesions which were noted on the soft palate and buccal mucosa of the patient are not frequently seen in rickettsialpox. Greenberg and Pellitteri (*5*) reported oral lesions in only 2 of 144 cases and Rose (*1*), 9 of 35 cases.

The interpretation of the complement fixation tests is somewhat complicated in this instance by the previous vaccinations. The rise in antibody titer with typhus antigens is best ascribed to the recent inoculation of the patient with typhus vaccines. A rise in titer of this slight degree is often encountered in the post-vaccination period,

but is much lower than values obtained after typhus infections (*4*). The appearance in the convalescent period of complement-fixing antibodies both to rickettsialpox and to Rocky Mountain spotted fever antigens is the normal serological pattern of rickettsialpox (*5*). The possibility must be considered that these antibodies represent a delayed serological response to the vaccination against spotted fever. However, the rise in titer in this instance is distinctly larger than any which we have encountered in the sera of other persons receiving Rocky Mountain spotted fever vaccine (*6*). It is noteworthy that antibodies for typhus antigens were already present at the onset of the illness, while those for Rocky Mountain spotted fever and rickettsialpox appeared between the seventh and twelfth days of illness. One might expect, if antibodies were to be produced by the vaccination against spotted fever, that a detectable titer would have appeared about the same time as did those against typhus, since the dates of vaccination were identical. For these reasons, the complement fixation tests may be best interpreted as indicative of an infection with rickettsialpox. The negative agglutination tests with *Proteus* antigens is in accord with this diagnosis.

The infection with rickettsialpox in this case is consistent with the hypothesis that vaccination against Rocky Mountain spotted fever does not confer complete immunity against rickettsialpox.

The institution of treatment with chloramphenicol on the fifth day of illness was followed in 36 hours by a drop in temperature and subsidence of symptoms. Although the possibility of spontaneous recovery is not excluded, such a response is similar to that noted with chloramphenicol in epidemic typhus, scrub typhus, and Rocky Mountain spotted fever (*7*). Rickettsialpox has previously been shown to be amenable to treatment with aureomycin (*1*).

## Summary

A laboratory worker exposed to the MK strain of rickettsialpox suffered an acute febrile illness accompanied by a rash typical of rickettsialpox. Serological data support the clinical diagnosis. The causative agent was not isolated from the patient's blood. Our case and that reported by Rose (*1*) indicate the potential hazard involved in working with rickettsialpox in the laboratory.

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## Williams Retires, Masur New BMS Chief

Jack Masur, M.D.

Ralph C. Williams, M.D.

Appointment of Dr. Jack Masur as Chief of the Bureau of Medical Services to succeed Dr. Ralph C. Williams has been announced by Leonard A. Scheele, Surgeon General of the Public Health Service.

Dr. Williams retired February 1 from the Public Health Service after 33 years of active duty. He has become Director of the Division of Medical Services for the Georgia Department of Public Health in Atlanta.

Dr. Masur has served as Chief of the Research Facilities Planning Branch and Director of the Clinical Center at the National Institutes of Health since 1948. The planning and construction of the Clinical Center, the largest research facility of its kind in the world, and which is scheduled to open in 1952, has been largely accomplished under his direction.

Entering the Public Health Service in 1943, Dr. Masur served until 1944 as Hospital Officer of the U. S. Office of Civilian Defense. In 1944–45, he was Chief Medical Officer of the Office of Vocational Rehabilitation, FSA. He then served for 2 years as consultant on the Hospital Building Committee of the Federation of Jewish Philanthropies, New York City. From 1941 to 1943, he was Executive Director of Lebanon Hospital, and from 1936 to 1940, Assistant Director of Montefiore Hospital for Chronic Diseases, both in New York City.

Dr. Williams was engaged for a time in the private practice of medicine in Alabama and for 3 years was with the Alabama State Health Department. He entered the Public Health Service in 1917 and since that time has served in many capacities. He was editor of the PUBLIC HEALTH REPORTS for 9 years and during that period was in charge of the public information activities of the Public Health Service. From 1936 to 1942 he was Chief Medical Officer of the Farm Security Administration. For 2 years during World War II, he was in charge of Public Health Service District No. 1. In 1943, Dr. Williams was assigned as Chief of the Bureau of Medical Services and served in that capacity until his retirement.

Dr. Williams has just completed the first comprehensive history ever prepared on the work of the Public Health Service since its establishment more than 150 years ago. This book, The United States Public Health Service 1798–1950, is being published by Whittet and Shepperson, Richmond, Va., and is expected to be in print by June of this year

# Incidence of Disease

*No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring*

## UNITED STATES

### Reports from States for Week Ended February 17, 1951

The number of cases of influenza for the current week was 5,581 as compared with 5,243 for the same week last year which was the 5-year median. A total of 3,355 cases was reported for the week ended February 10, 1951. Three States, Massachusetts, New York, and Pennsylvania, in which mild respiratory infections are now prevalent do not report influenza.

In New York State, as reported by Dr. R. M. Albrecht, a disease clinically resembling influenza occurred among university students in Syracuse in December 1950. A similar outbreak in a State hospital followed, but in neither instance was influenza virus isolated. The first proved occurrence of influenza in upstate New York affected Niagara Falls and the city of Buffalo. No deaths attributed to influenza have been reported in this area. Madison and Chenango Counties have also had clinical influenza. Clinical influenza has again involved Syracuse, where 250 cases were admitted to the university infirmary. A junior college in Dutchess County had 40 cases in a population of 185. A hemagglutinating agent has been isolated from cases in Niagara Falls and Syracuse and from cases in Madison and Chenango Counties. There has been no increase in mortality in Buffalo and Syracuse.

Dr. Morris Greenburg, New York City Health Department, reports an outbreak of a disease resembling influenza in a 5,000-bed hospital in the Bronx. About 250 cases in patients and attendants have been reported. The outbreak started in 1 ward and spread to 7 others where about 500 patients are housed. Throat washings and acute blood have been taken for laboratory examination.

Dr. M. M. Siegel, Children's Hospital, Philadelphia, reports an increased incidence of respiratory disease in the Philadelphia area.

Dr. Vlado Getting, Commissioner of Public Health, Massachusetts, has reported that upper respiratory infections causing absenteeism of 10 to 20 percent is widespread in the eastern part of Massachusetts. Most of the cases are stated to be mild and of short duration.

Dr. W. L. Halverson, California Director of Health, states that

reports of local health officers indicate that the mild upper respiratory infection is still confined to northern and central California. Specimens of blood submitted to the regional influenza laboratory from one district in central California showed that A-prime influenza virus was present. Official reports of influenza in California during January were below the 5-year median but were more than three times the median during the first 2 weeks of February.

The above reports in conjunction with laboratory findings reported indicate the occurrence of localized epidemics of influenza principally due to type A-prime virus, especially in the Middle Atlantic States. There was little influenza reported in this area last year. Mortality reports from 106 cities in the United States showed a significant rise in number of deaths from all causes in only one area. A 7-percent rise in number was reported in the cities located in the Middle Atlantic States for the week ended February 17 as compared with the previous week.

*Comparative Data for Cases of Specified Reportable Diseases: United States*

[Numbers after diseases are International List numbers 1948 revision]

| Disease | Total for week ended— | | 5-year median 1946-50 | Seasonal low week | Cumulative total since seasonal low week | | 5-year median 1945-46 through 1949-50 | Cumulative total for calendar year— | | 5-year median 1946-50 |
|---|---|---|---|---|---|---|---|---|---|---|
| | Feb. 17, 1951 | Feb. 18, 1950 | | | 1950-51 | 1949-50 | | 1951 | 1950 | |
| Anthrax (062) | 1 | ------ | ------- | (1) | (1) | (1) | (1) | 10 | 2 | 8 |
| Diphtheria (055) | 105 | 143 | 207 | 27th | 3, 589 | 5, 470 | 7, 960 | 682 | 1, 196 | 1, 602 |
| Encephalitis, acute infectious (082) | 16 | 6 | 6 | (1) | (1) | (1) | (1) | 72 | 73 | 53 |
| Influenza (480-483) | 5, 581 | 5, 243 | 5, 243 | 30th | 34, 210 | 30, 744 | 33, 075 | 19, 668 | 20, 160 | 20, 160 |
| Measles (085) | 13,890 | 7, 136 | 13, 932 | 35th | 99, 179 | 55, 959 | 79, 598 | 70, 478 | 36, 829 | 53, 474 |
| Meningitis, meningococcal (057.0) | 108 | 82 | 88 | 37th | 1, 705 | 1, 524 | 1, 524 | 744 | 611 | 608 |
| Pneumonia (490-493) | 2, 037 | 2, 524 | ------- | (1) | (1) | (1) | (1) | [2] 12,317 | 16, 202 | ------- |
| Poliomyelitis, acute (080) | 92 | 97 | 43 | 11th | 33, 126 | 42, 269 | 25, 246 | 907 | 795 | 449 |
| Rocky Mountain spotted fever (104) | ------ | ------ | 1 | (1) | (1) | (1) | (1) | 2 | 6 | 5 |
| Scarlet fever (050) [3] | 2, 435 | 2, 005 | 2, 798 | 32d | 31, 064 | 28, 415 | 41, 437 | 15, 373 | 11, 976 | 17, 837 |
| Smallpox (084) | 2 | ------ | 2 | 35th | 14 | 16 | 43 | 6 | 9 | 22 |
| Tularemia (059) | 12 | 22 | 25 | (1) | (1) | (1) | (1) | 105 | 167 | 167 |
| Typhoid and paratyphoid fever (040, 041) [4] | 35 | 49 | 42 | 11th | 3, 186 | 3, 691 | 3, 691 | 271 | 317 | 292 |
| Whooping cough (056) | 1, 546 | 2, 701 | 2, 095 | 39th | 33, 111 | 38, 587 | 38, 832 | 11, 509 | 17, 051 | 15, 743 |

[1] Not computed. [2] Addition: Tennessee, week ended January 27, 67 cases.
[3] Including cases reported as streptococcal sore throat.
[4] Including cases reported as salmonellosis.

## Reported Cases of Selected Communicable Diseases: United States, Week Ended Feb. 17, 1951

[Numbers under diseases are International List numbers, 1948 revision]

| Area | Diphtheria (055) | Encephalitis, infectious (082) | Influenza (480–483) | Measles (085) | Meningitis, meningococcal (057.0) | Pneumonia (490–493) | Poliomyelitis (080) |
|---|---|---|---|---|---|---|---|
| **United States** | **105** | **16** | **5,581** | **13,890** | **108** | **2,037** | **92** |
| **New England** | **1** | **1** | **34** | **613** | **1** | **64** | **3** |
| Maine | | | 12 | 3 | | 6 | |
| New Hampshire | | | 1 | 3 | | 2 | |
| Vermont | | | 17 | 226 | | | |
| Massachusetts | 1 | 1 | | 329 | 1 | | |
| Rhode Island | | | 2 | 3 | | 4 | |
| Connecticut | | | 2 | 49 | | 52 | 3 |
| **Middle Atlantic** | **4** | **4** | **27** | **1,600** | **14** | **204** | **12** |
| New York | 3 | 3 | [1] 23 | 440 | 5 | 42 | 11 |
| New Jersey | 1 | 1 | 4 | 409 | 5 | 82 | |
| Pennsylvania | | | | 751 | 4 | 80 | 1 |
| **East North Central** | **6** | **3** | **15** | **2,499** | **21** | **116** | **9** |
| Ohio | 4 | | | 649 | 9 | | 3 |
| Indiana | | | 6 | 205 | 1 | 11 | 2 |
| Illinois | 2 | | 9 | 325 | 2 | 72 | 1 |
| Michigan | | 3 | | 419 | 3 | 33 | 2 |
| Wisconsin | | | | 901 | 6 | | 1 |
| **West North Central** | **5** | **1** | **7** | **1,086** | **8** | **46** | **16** |
| Minnesota | 2 | | | 84 | 2 | 5 | |
| Iowa | | | | 2 | 1 | 3 | 3 |
| Missouri | 3 | 1 | 5 | 602 | 2 | 1 | 5 |
| North Dakota | | | 2 | 32 | 1 | 19 | 1 |
| South Dakota | | | | 21 | 1 | | 1 |
| Nebraska | | | | 2 | | | 4 |
| Kansas | | | | 343 | 1 | 18 | 2 |
| **South Atlantic** | **15** | **2** | **1,436** | **1,096** | **22** | **285** | **13** |
| Delaware | | | | 24 | | | |
| Maryland | | | 13 | 57 | 3 | 31 | |
| District of Columbia | | | 14 | 54 | 1 | 22 | |
| Virginia | 4 | 2 | 731 | 153 | 4 | 139 | |
| West Virginia | 1 | | 283 | 120 | 4 | 18 | 1 |
| North Carolina | 2 | | | 133 | 5 | | 5 |
| South Carolina | 1 | | 212 | 23 | 1 | 40 | |
| Georgia | 4 | | 183 | 490 | 1 | 35 | 5 |
| Florida | 3 | | | 33 | 3 | | 2 |
| **East South Central** | **18** | **2** | **1,943** | **621** | **18** | **118** | **6** |
| Kentucky | 2 | | 8 | 389 | 10 | 63 | |
| Tennessee | 1 | 1 | 87 | 113 | 6 | | 3 |
| Alabama | 8 | | 1,832 | 24 | 1 | | |
| Mississippi | 7 | 1 | 16 | 95 | 1 | 55 | 3 |
| **West South Central** | **34** | **1** | **738** | **3,155** | **8** | **919** | **9** |
| Arkansas | 4 | | 526 | 151 | 2 | 76 | |
| Louisiana | 4 | | 11 | 110 | 1 | 47 | 1 |
| Oklahoma | 4 | | 201 | 308 | 1 | 63 | 1 |
| Texas | 22 | 1 | | 2,586 | 4 | 733 | 7 |
| **Mountain** | **6** | | **1,092** | **1,529** | **5** | **154** | **5** |
| Montana | 1 | | 7 | 38 | | | |
| Idaho | | | | 64 | | | 1 |
| Wyoming | | | | 81 | | 2 | |
| Colorado | 1 | | 72 | 862 | 4 | 59 | 4 |
| New Mexico | 3 | | 9 | 36 | | 40 | |
| Arizona | 1 | | 653 | 368 | 1 | 53 | |
| Utah | | | | 45 | | | |
| Nevada | | | 351 | 35 | | | |
| **Pacific** | **16** | **2** | **289** | **1,691** | **11** | **131** | **19** |
| Washington | 1 | | 11 | 483 | 2 | 7 | 4 |
| Oregon | 7 | | 74 | 49 | 2 | 46 | 6 |
| California | 8 | 2 | 204 | 1,159 | 7 | 78 | 9 |
| Alaska | | | | | | | |
| Hawaii | | | 1 | 2 | | | |

[1] New York City only.
*Anthrax:* Pennsylvania, 1 case.

## Reported Cases of Selected Communicable Diseases: United States, Week Ended Feb. 17, 1951—Continued

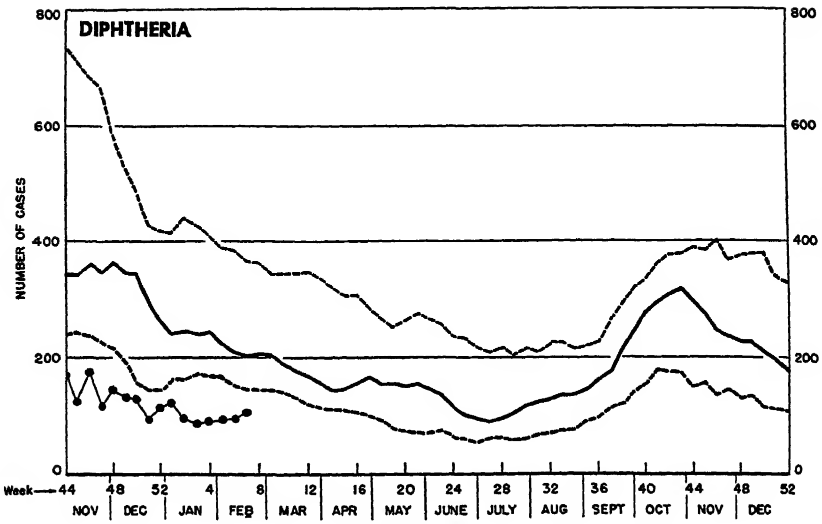
[Numbers under diseases are International List numbers, 1948 revision]

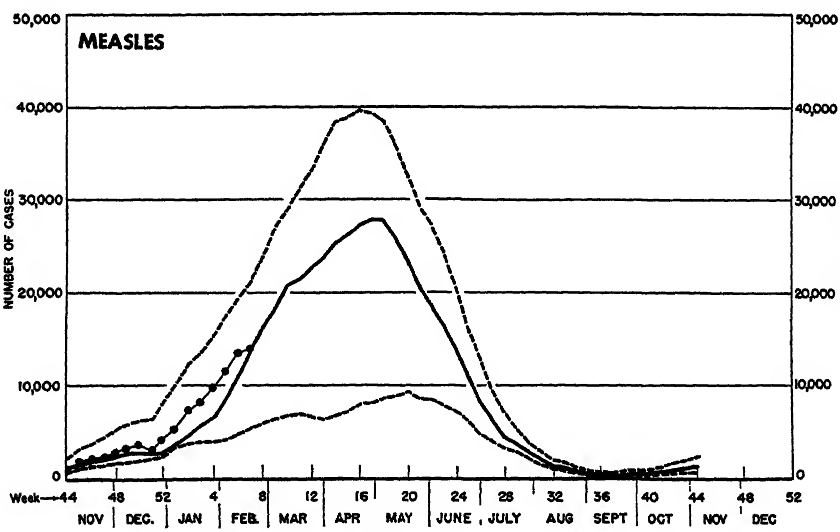
| Area | Rocky Mountain spotted fever (104) | Scarlet fever (050) | Smallpox (084) | Tularemia (059) | Typhoid and paratyphoid fever [1] (040, 041) | Whooping cough (056) | Rabies in animals |
|---|---|---|---|---|---|---|---|
| **United States** | - | 2,435 | 2 | 12 | 35 | 1,546 | 120 |
| **New England** | - | 223 | - | - | - | 166 | - |
| Maine | - | 8 | - | - | - | 20 | - |
| New Hampshire | - | 1 | - | - | - | 11 | - |
| Vermont | - | 3 | - | - | - | 31 | - |
| Massachusetts | - | 172 | - | - | - | 75 | - |
| Rhode Island | - | 12 | - | - | - | 16 | - |
| Connecticut | - | 27 | - | - | - | 13 | - |
| **Middle Atlantic** | - | 441 | - | - | 5 | 276 | 8 |
| New York | - | [2] 220 | - | - | 2 | 73 | 8 |
| New Jersey | - | 89 | - | - | - | 86 | - |
| Pennsylvania | - | 132 | - | - | 3 | 117 | - |
| **East North Central** | - | 615 | 1 | 1 | - | 190 | 19 |
| Ohio | - | 196 | - | - | - | 38 | 2 |
| Indiana | - | 49 | - | - | - | 21 | 11 |
| Illinois | - | 84 | - | 1 | - | 12 | 4 |
| Michigan | - | 231 | - | - | - | 62 | 2 |
| Wisconsin | - | 55 | 1 | - | - | 57 | - |
| **West North Central** | - | 129 | - | - | - | 80 | 13 |
| Minnesota | - | 31 | - | - | - | 10 | 1 |
| Iowa | - | 23 | - | - | - | 11 | 12 |
| Missouri | - | 28 | - | - | - | 11 | - |
| North Dakota | - | 4 | - | - | - | 3 | - |
| South Dakota | - | - | - | - | - | 4 | - |
| Nebraska | - | 8 | - | - | - | 3 | - |
| Kansas | - | 35 | - | - | - | 38 | - |
| **South Atlantic** | - | 226 | - | 7 | 6 | 183 | 17 |
| Delaware | - | 5 | - | - | - | 3 | - |
| Maryland | - | 26 | - | - | 1 | 26 | - |
| District of Columbia | - | 18 | - | - | - | 1 | - |
| Virginia | - | 51 | - | 1 | 2 | 34 | 3 |
| West Virginia | - | 14 | - | - | - | 20 | 2 |
| North Carolina | - | 67 | - | - | 1 | 38 | - |
| South Carolina | - | 9 | - | - | - | 3 | 7 |
| Georgia | - | 14 | - | 6 | - | 44 | 5 |
| Florida | - | [2] 22 | - | - | 2 | 14 | - |
| **East South Central** | - | 106 | - | - | 6 | 76 | 25 |
| Kentucky | - | 37 | - | - | 2 | 21 | 11 |
| Tennessee | - | 59 | - | - | 4 | 11 | 12 |
| Alabama | - | 10 | - | - | - | 37 | - |
| Mississippi | - | - | - | - | - | 7 | 2 |
| **West South Central** | - | 137 | - | 3 | 8 | 382 | 36 |
| Arkansas | - | 8 | - | 3 | 2 | 45 | 3 |
| Louisiana | - | 24 | - | - | 2 | 2 | - |
| Oklahoma | - | 18 | - | - | 1 | 37 | - |
| Texas | - | 87 | - | - | 3 | 208 | 33 |
| **Mountain** | - | 183 | 1 | 1 | 2 | 123 | 1 |
| Montana | - | 12 | - | - | - | 20 | - |
| Idaho | - | 36 | - | - | - | 2 | - |
| Wyoming | - | 1 | - | - | - | 5 | - |
| Colorado | - | 15 | - | - | 1 | 16 | - |
| New Mexico | - | 4 | - | 1 | 1 | 34 | - |
| Arizona | - | 17 | 1 | - | - | 45 | 1 |
| Utah | - | [2] 95 | - | - | - | - | - |
| Nevada | - | 3 | - | - | - | 1 | - |
| **Pacific** | - | 375 | - | - | 8 | 70 | 1 |
| Washington | - | 124 | - | - | 2 | 18 | - |
| Oregon | - | 78 | - | - | 3 | 2 | - |
| California | - | [2] 173 | - | - | 3 | 50 | 1 |
| Alaska | - | - | - | - | - | 9 | - |
| Hawaii | - | 2 | - | - | - | - | - |

[1] Including cases reported as salmonellosis. [2] Including cases reported as streptococcal sore throat.

# Communicable Disease Charts

*All reporting States, November 1950 through February 17, 1951*




The upper and lower broken lines represent the highest and lowest figures recorded for the corresponding weeks in the preceding 5 years. The solid line is a median figure for the preceding 5 years. All three lines have been smoothed by a 3-week moving average. The dots represent numbers of cases reported weekly, 1950–51.

# FOREIGN REPORTS

## CANADA

### Reported Cases of Certain Diseases

*Week Ended Jan. 27, 1951*

| Disease | Total | New-found-land | Prince Ed-ward Island | Nova Scotia | New Bruns-wick | Que-bec | On-tario | Mani-toba | Sas-katch-ewan | Al-berta | Brit-ish Co-lum-bia |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Brucellosis | 5 | | | | | 3 | 1 | | | | 1 |
| Chickenpox | 1,584 | 4 | | 60 | | 227 | 770 | 54 | 111 | 129 | 229 |
| Diphtheria | 8 | | | | | 5 | 3 | | | | |
| Dysentery, bacillary | 5 | | | | | 3 | | | | | 2 |
| Encephalitis, infectious | 1 | | | | | | 1 | | | | |
| German measles | 427 | | | 23 | | 27 | 180 | 2 | 19 | 16 | 160 |
| Influenza | 562 | 155 | | 401 | 2 | | 2 | 2 | | | |
| Measles | 2,478 | 6 | | 16 | 2 | 151 | 2,058 | 104 | 50 | 14 | 77 |
| Meningitis, meningococcal | 4 | | | | | | 2 | | 1 | 1 | |
| Mumps | 1,649 | 7 | | 26 | 1 | 169 | 515 | 50 | 240 | 233 | 408 |
| Poliomyelitis | 1 | | | | | | 1 | | | | |
| Scarlet fever | 353 | | | | 1 | 89 | 49 | 31 | 17 | 75 | 91 |
| Tuberculosis (all forms) | 245 | | | 10 | 20 | 82 | 31 | 12 | 7 | 50 | 33 |
| Typhoid and paratyphoid fever | 22 | | | | | 15 | | | | 2 | 5 |
| Venereal diseases: | | | | | | | | | | | |
| Gonorrhea | 299 | 5 | | 15 | 11 | 56 | 35 | 36 | 16 | 33 | 92 |
| Syphilis | 96 | 5 | | 2 | 2 | 38 | 18 | 3 | 9 | 2 | 17 |
| Primary | 4 | | | | | 1 | 1 | | 2 | | |
| Secondary | 1 | | | | | 1 | | | | | |
| Other | 91 | 5 | | 2 | 2 | 36 | 17 | 3 | 7 | 2 | 17 |
| Whooping cough | 191 | 3 | | 9 | 4 | 47 | 50 | 10 | 4 | 4 | 60 |

*Week Ended Feb. 3, 1951*

| Disease | Total | New-found-land | Prince Ed-ward Island | Nova Scotia | New Bruns-wick | Que-bec | On-tario | Mani-toba | Sas-katch-ewan | Al-berta | Brit-ish Co-lum-bia |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Brucellosis | 3 | | | | | 2 | | | | | 1 |
| Chickenpox | 1,316 | | | 16 | 94 | 213 | 592 | 41 | 35 | 115 | 210 |
| Diphtheria | 2 | | | | | 1 | | 1 | | | |
| Dysentery, bacillary | 6 | | | | | 5 | | | | | 1 |
| German measles | 443 | | | 45 | | 31 | 243 | | 11 | 24 | 89 |
| Influenza | 1,339 | 659 | | 639 | 3 | | | 7 | 20 | | 11 |
| Measles | 2,621 | 10 | | 28 | 11 | 210 | 2,092 | 169 | 49 | 25 | 27 |
| Meningitis, meningococcal | 9 | | | | | 6 | 1 | 1 | 1 | | |
| Mumps | 1,501 | 4 | | 12 | 1 | 273 | 470 | 54 | 166 | 256 | 265 |
| Poliomyelitis | 1 | | | | | | | | | 1 | |
| Scarlet fever | 327 | | | 1 | 4 | 76 | 51 | 38 | 7 | 76 | 74 |
| Tuberculosis (all forms) | 227 | 8 | | 6 | 3 | 52 | 35 | 24 | 4 | 64 | 31 |
| Typhoid and paratyphoid fever | 2 | | | | | 2 | | | | | |
| Venereal diseases: | | | | | | | | | | | |
| Gonorrhea | 280 | 4 | | 3 | 11 | 60 | 48 | 33 | 11 | 31 | 79 |
| Syphilis | 104 | 5 | | 8 | 4 | 44 | 19 | 2 | 9 | 6 | 7 |
| Primary | 10 | 1 | | | 1 | 3 | 4 | | | 1 | |
| Secondary | 6 | | | | | 2 | | | 2 | 2 | |
| Other | 88 | 4 | | 8 | 3 | 39 | 15 | 2 | 7 | 3 | 7 |
| Other forms | 1 | | | | | | | | | | 1 |
| Whooping cough | 361 | 1 | | 3 | 78 | 56 | 127 | 35 | 1 | 11 | 49 |

## REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

**The following reports include only items of unusual incidence or of special interest and the occurrence of these diseases, except yellow fever, in localities which had not recently reported cases. All reports of yellow fever are published currently. A table showing the accumulated figures for these diseases for the year to date is published in the Public Health Reports for the last Friday in each month.**

### Cholera

*India.* Cholera was reported in ports of India for the week ended February 3, 1951, as follows: Calcutta, 82 cases, Madras, 17, Tiruchirappalli, 14, Negapatam, 7, and Bombay, 1.

### Plague

*Belgian Congo.* One fatal case of plague was reported in Stanleyville Province on February 13, 1951.

### Smallpox

*Burma.* During the week ended February 3, 1951, smallpox was reported in Burma as follows: Kyaukpyu, 22 cases, Akyab, 12, and Rangoon, 2.

*Indochina.* During the week ended February 3, 1951, smallpox was reported in Viet Nam as follows: Saigon, two cases, and Haiphong one.

*Iran.* During the week ended February 3, 1951, 10 cases of smallpox were reported in various airports of Iran.

*Iraq.* For the week ended February 10, 1951, 16 cases of smallpox were reported in Iraq.

### Typhus Fever

*Iran.* During the week ended February 3, 1951, eight cases of typhus fever were reported in Iran.

*Morocco (French).* One case of typhus fever was reported in Casablanca during the period January 21–31, 1951.

*Turkey.* During the week ended February 10, 1951, six cases of typhus fever were reported in Turkey. Istanbul and Izmir reported one case each for the week.

### Yellow Fever

*Sierra Leone.* One suspected case of yellow fever was reported in Freetown on February 8, 1951. This case was in an uninoculated African male who was hospitalized February 8.

## Plague Infection in Lea County, New Mexico

A report dated February 2, 1951, states that plague infection was proved positive for two specimens consisting of tissue and 30 fleas from a wood-rat, *Neotoma albigula*, and its nest. The rat was found dead January 15, 1951, 4 miles east of Hobbs in Lea County.

A report dated February 13, 1951, states that plague infection was proved positive in a specimen of 36 fleas taken from 2 wood rats, *Neotoma albigula*, trapped January 19, 1951, 1½ miles east of Hobbs City dump.

## One County's Health Services

A limited number of mimeographed copies of "Organized Services in a Rural County," a study by Dr. Milton I. Roemer, public health physician, and Ethel A. Wilson, public health analyst, are now available from the Division of State Grants of the Public Health Service.

The study, conducted in Monongalia County, W. Va., in 1949, sets down systematically the structure and function of all organized health services having an impact on the people of one county. Considered are the services not only of the health agencies but also of the many other agencies in whose general efforts health may be only one part. Voluntary agencies and even businesses, as well as governmental authorities, are included. The programs described emanate from Federal, State, and community levels and relate to medical care as well as prevention of disease or injury.

A study of this comprehensiveness can serve as a reminder to the public health worker of the manifold programs of health promotion going on every day around him, with which he may be maintaining little relationship. The challenge to the health department as a "coordinating center" for all community health service is made clear.

Inventories and analyses of this type can be made in any community. And the methods followed in this study may be of assistance.

+ + +

The printing of this publication has been approved by the Director of the Bureau of the Budget (August 10, 1949).

The Public Health Reports, first published in 1878 under authority of an act of Congress of April 29 of that year, is issued weekly by the Public Health Service through the Division of Public Health Methods, pursuant to the following authority of law: United States Code, title 42, sections 241, 245, 247; title 44, section 220.

It contains (1) current information regarding the incidence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

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# Public Health Reports

VOLUME 66 MARCH 16, 1951 NUMBER 11

IN THIS ISSUE

New Standard Plate Count Media for Dairy Products

*Brucella abortus* in Slaughtered Reactor Cattle

Pertussis Vaccine Grown on Charcoal Agar

FEDERAL SECURITY AGENCY

PUBLIC HEALTH SERVICE

**FEDERAL SECURITY AGENCY**
*Oscar R. Ewing, Administrator*

**PUBLIC HEALTH SERVICE**
*Leonard A. Scheele, Surgeon General*

**Division of Public Health Methods**
*G. St. J. Perrott, Chief of Division*

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# Public Health Reports

*Vol. 66* • MARCH 16, 1951 • *No. 11*

## Studies To Formulate New Media for the Standard Plate Count of Dairy Products

By LEON BUCHBINDER, YETTA BARIS, EDYTHE ALFF, ERNESTINE REYNOLDS, and ELIZABETH DILLON;* and VIVIAN PESSIN, LOUIS PINCUS, and AARON STRAUSS**

The present Standard Methods agar for the bacterial plate count of dairy products, so-called T.G.E.M. agar (Tryptone, 0.5 percent; dextrose, 0.1 percent; beef extract, 0.3 percent; skim milk, 1.0 percent; and agar, 1.5 percent), has been in use for more than 10 years.[1] This medium, called the standard medium in this report, was formulated when attempts were made to obtain a more productive agar than the official standard medium existing at the time. It fulfilled this purpose and was adopted. That it is not an ideal medium is attested by a number of persons who use it routinely.

The disadvantages stem from the presence of two ingredients. One of the ingredients, skim milk, gives rise to several difficulties. In the first place, it takes skill to add skim milk to the medium successfully in the form of dissolved dried powder. Second, after being added to the medium, milk sometimes exhibits a tendency to settle out when the medium is held in a tempering bath prior to pouring. Finally, and perhaps most important, milk induces cloudiness in the agar which, although seeming to make colonies stand out more distinctly at times, actually tends to make counting more difficult. This difficulty is due to the selection which the eye must make between very fine particles of milk and fine colonies. There is little question that, as a rule, colonies on a clear medium are more easily counted. During the experimental work presented here, technicians experienced in the use of the standard medium volunteered the information that the new milkless media studied caused less eyestrain.

A second objection to the present standard medium is the presence of a nonstandardized product, beef extract. The best information

*From the Bureau of Laboratories, and **the Bureau of Records and Statistics, New York City Department of Health Presented, in part, before the Laboratory Section of the American Public Health Association at the Seventy-sixth Annual Meeting in Boston, Mass, Nov. 9, 1948.

[1] Standard Methods for the Examination of Dairy Products. Ed 9, American Public Health Association, 1948, p 93

that could be obtained concerning this substance is that, regardless of brand name, its composition is unknown. It is a byproduct of meat processing and usually comes from Argentina.

Presented here are studies, made in a laboratory which routinely carries out the standard plate count on dairy products, of a number of media which do not contain the defects mentioned and which yield plate counts equal to or exceeding those of the present standard medium.

## Experimental

The general technique used is advocated in the Ninth Edition of Standard Methods for the Examination of Dairy Products. All the new media studied, except two, were prepared directly from ingredients in this laboratory. They were compared with the standard medium, prepared in a similar manner, and in some instances with each other. Pasteurized milk was the product most frequently used for the tests, although raw milk and pasteurized cream also were studied.

Dilutions of 1/100 and 1/1000 were used for pasteurized milk, and 1/1000 and 1/10000 for raw milk and pasteurized cream. Duplicate plates in each of the two dilutions were prepared for both the test and standard media. When several test media were studied simultaneously, four plates were made with each medium tested. Only one dilution was counted for record purposes; that which showed counts under 300 was preferred. The mean of the duplicate plates of the test medium in the dilution used and the corresponding mean of the standard medium are referred to as a "paired count."

## Statistical Method

When comparing two series of observations in which each observation of one series is positively correlated with an observation in the other, it is more efficient to work with the differences of the paired observations than to treat the two series as independent. This is so because the first method will give results which will vary less than those of the second if the experiment is replicated.

It is also demonstrable that in certain kinds of problems involving bacteriological counts the use of logarithms will result in more reliable statistics. For example, a series of counts taken from different samples will usually not be normally distributed, while the distribution of the logarithms of such counts will be approximately normal. In such cases, where normal curve theory is to be applied, the correct procedure is to convert the counts to logarithms before performing the computations.

It was determined, for each test medium, the probability that the average difference between the pairs of logarithms (test medium and

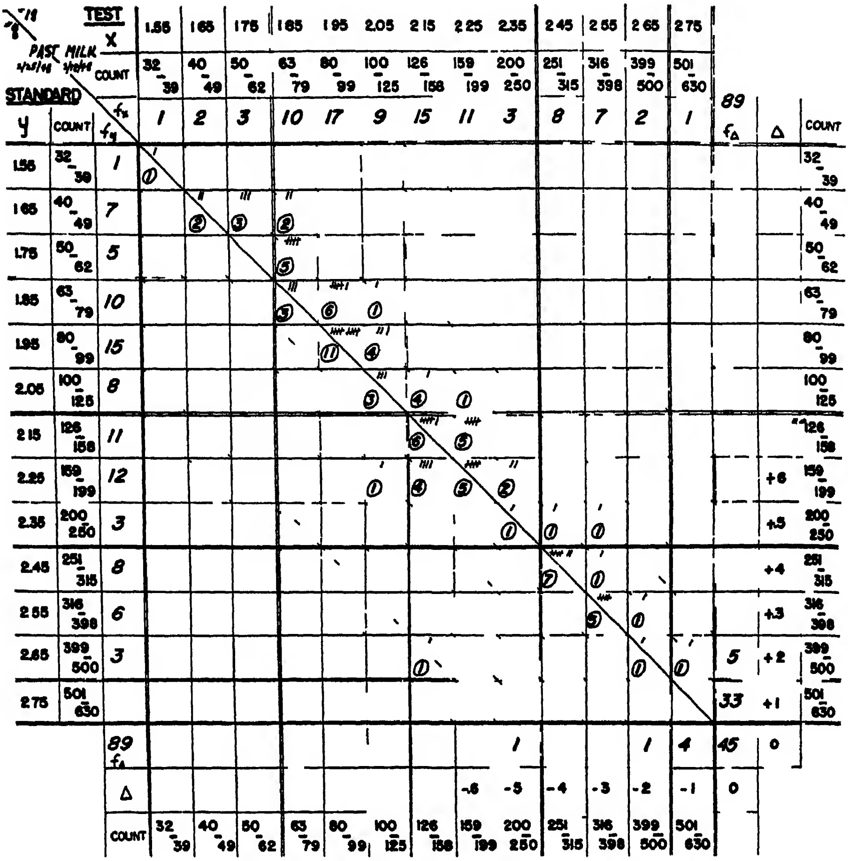
standard medium counts for the same sample) could have been exceeded by chance alone, if there were actually no difference between the test and standard media. When this probability was less than 1 chance in 20 ($\bar{\Delta}/\sigma_{\bar{\Delta}} \geq 1.96$), the difference was said to be statistically significant. All the differences listed in the tables, except those marked with an asterisk, are statistically significant. The last column in the tables gives the range within which the true percent difference lies approximately 95 percent of the time.

When the volume of data is relatively small, the labor involved in conversion to logarithms is not prohibitive. However, when the data are extensive and computing equipment limited, practical considerations may present a serious, and sometimes insuperable, obstacle to the use of logarithms.[2] The procedure used in this analysis, although somewhat less accurate than the use of ungrouped logarithms, is not biased; and it eliminates the drudgery of conversion to logarithms. Essentially, it consists of the use of a correlation table, with the class limits of counts chosen so that the corresponding class intervals of the logarithms of the counts are equal in width. Although some information is lost when wide class intervals are used instead of exact values, the loss is not important when one is concerned with the exploration of voluminous data to detect major differences.

Since this procedure, or adaptations of it, may be of use elsewhere, it is described in some detail. The type of work sheet used is illustrated in the chart. The numbers and symbols in roman type are printed on the work sheet. The tally marks and the numbers in italics were recorded while working on the results of one series of counts with the standard medium (No. 8) and test medium (No. 18), using pasteurized milk. The rows and columns on the original work sheet which were not used for this sample are omitted from the illustration.

The column and row headed "Count" refer to the observed counts of the standard and test media, respectively. The class limits of the count intervals are chosen so that their logarithms are 0.1 unit apart. Thus the logarithms of 32 to 39 fall in the class interval 1.50–1.59, the logarithms of 40 to 49 fall in the class interval 1.60–1.69, etc. The midpoints of the logarithm classes are given in the first column and in the first row (y and x).

[2] The conflict that sometimes arises between theoretical requirements and practical possibilities is ably expressed by W. G. Cochran in his monograph, The Present Status of Biometry: "In view of the growing complexity of statistical techniques, a trend which is unlikely to be reversed, more attention might profitably be given to simpler methods whose efficiency is satisfactory if not the maximum attainable. It is easy for the statistician, who may use his method only in the preparation of an example to be included in a publication, to persuade himself that the method is relatively simple, but his views might change if he were forced to apply it continually with poor computing equipment . . . It is interesting to note that in the field of quality control a deliberate campaign has been carried on to keep the techniques very elementary, even at a loss both in efficiency and in flexibility. While this has sometimes led to teaching of rules of procedure rather than principles, it has contributed to the rapid dissemination of the methods and is evidence of the sound attitude that the methods are a means and not an end."




| Δ | $f_\Delta$ | $\Delta f_\Delta$ | $\Delta^2 f_\Delta$ |
|---|---|---|---|
| -5 | 1 | -5 | 25 |
| -2 | 1 | -2 | 04 |
| -1 | 4 | -4 | 04 |
| 0 | 45 | 0 | 0 |
| 1 | 33 | 33 | 33 |
| 2 | 5 | 10 | 20 |
| | | | |
| | 89 | 32 | 86 |

$N = \Sigma f_\Delta = 89$

$\bar{\Delta} = \frac{\Sigma \Delta f}{N} = \frac{32}{89} = .036$

$\sigma_{\bar{\Delta}} = \frac{\sqrt{\Sigma \Delta^2 f - \bar{\Delta}\Sigma \Delta f}}{N}$

$\sigma_{\bar{\Delta}} = \frac{\sqrt{86-(.036)(32)}}{89}$

$\sigma_{\bar{\Delta}} = .0097$

$\frac{\bar{\Delta}}{\sigma_{\bar{\Delta}}} = \frac{.036}{.0097} = 3.7$

$\bar{y} = \frac{\Sigma y f_y}{N} = \frac{186.55}{89} = 2.096$ antilog $\bar{y} = 125 = GM_y$

$\bar{x} = \frac{\Sigma x f_x}{N} = \frac{189.75}{89} = 2.132$ antilog $\bar{x} = 136 = GM_x$

$2\sigma_{\bar{\Delta}} = 2(.0097) = .0194$ antilog $(2\sigma_{\bar{\Delta}}) = 1.05$

RATIO OF TEST MEDIUM TO STANDARD MEDIUM

AVERAGE $= \frac{136}{125} \times 100 = 109$

LOWER LIMIT $\frac{109}{1.05} = 104$ UPPER LIMIT $= 109(1.05) = 114$

**Work sheet for testing significance of mean difference of logarithms of paired counts. Short method.**

The sheet is used first to tally the counts. A count of 488 on the standard medium and of 138 on the test medium is tallied in the box on the 399–500 row and in the 126–158 column. The remaining pairs of counts are similarly tallied. The number of tallies in each box is written down and circled. By adding across rows (sums in the $f_y$

column), and down columns (sums in the $f_x$ row), frequency distributions of the counts and of their logarithms are obtained. These distributions are used as a check of the tallying and of the normality of the data, and also for calculating the means of the two media. By adding along the diagonal lines and entering the sums in the $f_\Delta$ column and row, a frequency distribution of the differences of logarithms is obtained. This distribution is copied into the table at the lower left-hand corner, and calculations are completed as illustrated. If the ratio of the mean difference of the logarithms to its standard error ($\overline{\Delta}/\sigma_{\overline{\Delta}}$) is 1.96 or more, the difference between the two media may be considered significant.

To summarize, this procedure substitutes tallying and addition for (1) conversion to logarithms, (2) finding the difference of the pairs, and (3) formation of a frequency distribution. That both methods yield approximately the same results was shown by taking the data for a few test media and testing by the long method without grouping. The results were practically the same by both methods of calculation.

The work sheet was also used in the laboratory to check the results of test media after relatively few (15 or 20) counts were made. By tallying the results, and adding to form the frequency distribution, an estimate of the mean difference of the logarithms was obtained. The direction and size of the difference were two of the factors considered in deciding whether work on the medium was to be continued. Where the decision was affirmative, reference was made to a graph showing the estimated number of paired counts needed, with the given mean difference, to demonstrate a significant difference. This estimated number was then used as a guide to the amount of additional work needed on the test media.

## Results

The first media studied were unsatisfactory in that they were not as productive as the standard medium. These unsuccessful media comprised individual peptones, such as Trypticase, Tryptone, and Proteose Peptone No. 3, either alone or in combination, usually with dextrose and occasionally with sodium succinate and sodium citrate.

### Media Containing Difco Yeast Extract, a Peptone, and Dextrose as Essential Ingredients

The first successful medium found was No. 16, listed in table 1, which comprised Difco Yeast Extract, 1.5 percent; Difco Proteose Peptone No. 3, 0.5 percent; dextrose, 0.1 percent; sodium succinate, 0.2 percent; and agar, 1.5 percent. Pasteurized milk, raw milk, and pasteurized cream, when tested with this medium, yielded counts which were significantly higher than those found with the control standard medium. As seen in the table the difference was about 10

Table 1. *Productivity of various test media compared with the standard medium (T.G.M.)*

[Test media with Difco Yeast Extract, a peptone, and dextrose as essential ingredients]

| Test medium No. | Composition of test media (percent) | | | | | Product | Number samples | Geometric means | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Difco Yeast Extract | Difco Proteose Peptone No. 3 | Dextrose | Sodium succinate | Agar | | | Test medium | Standard medium (T.G.M.) | Percent difference (standard=100) Pos. | Percent difference (standard=100) Neg. | Confidence limits of percent difference (∓1.96σ) |
| 16 | 1.5 | 0.5 | 0.1 | 0.2 | 1.5 | Past. milk | 181 | 166 | 151 | 10 | | +7, +13 |
| | | | | | | Raw milk | 63 | 258 | 231 | 12 | | +7, +17 |
| | | | | | | Past. cream | 35 | 104 | 93 | 12 | | +6, +17 |
| | Changes in proportion of ingredients of medium No. 16 | | | | | | | | | | | |
| 18 | 1.5 | 0.5 | 0.1 | | 1.5 | Past. milk | 164 | 155 | 141 | 10 | | +7, +13 |
| | | | | | | Raw milk | 132 | 212 | 196 | 8 | | +6, +11 |
| | | | | | | Past. cream | 77 | 95 | 88 | 8 | | +4, +12 |
| 18C | (1) | (1) | (1) | (1) | (1) | Past. milk | 42 | 172 | 167 | 3 | | 0+, + 6 |
| | | | | | | Raw milk | 66 | 156 | 149 | 5 | | +1, + 8 |
| | | | | | | Past. cream | 59 | 98 | 90 | 9 | | +5, +13 |
| 22 | 1.0 | .5 | .1 | .2 | 1.5 | Past. milk | 44 | 294 | 272 | 8 | | +4, +13 |
| 23 | 1.0 | .5 | .1 | | 1.5 | Past. milk | 91 | 217 | 212 | *2 | | −1, + 6 |
| 17 | 2.0 | | .1 | .2 | 1.5 | Past. milk | 76 | 153 | 163 | | 6 | −11, − 1 |
| 25 | 1.0 | .5 | | | 1.5 | Past. milk | 33 | 173 | 209 | | 17 | −25, − 9 |

*Differences marked with an asterisk are statistically not significant (P>0.05). All other differences are significant.

[1] Same as No. 18 with addition of cover agar.

percent when based on the geometric means of the counts with each of the two media.

*Changes in Proportion of Ingredients*

It is a matter of debate whether a new standard medium should be more productive than the existing standard medium, since greater productivity might cause administrative difficulties. Attempts were made, therefore, to reduce the productivity of No. 16 by manipulating the quantities of ingredients or by omitting selected ingredients. Another consideration was the fact that No. 16 tended to promote surface growth which, at times, resulted in the presence of large spreader type colonies which interfered with counting.

The first alternative medium No. 18 which did not contain sodium succinate, was slightly less productive than No. 16. Medium No. 18C, which was the same as No. 18 except that a cover of neutral agar was placed over the solidified medium in order to reduce surface spreading, showed, as might have been expected, a still greater reduction when compared with the standard medium. Medium No. 22 (No. 16 modified by reducing the concentration of yeast extract by one-third) likewise yielded a smaller percent difference from the standard medium than did No. 16. Medium No. 23 (No. 22 with sodium succinate omitted) showed a still greater reduction in the percent of difference. This medium yielded only about 2 percent more colonies than did the standard medium by the method of comparison used.

When medium No. 22 was altered by omitting Proteose Peptone No. 3 and doubling the quantity of yeast extract (No. 17), and when medium No. 22 was changed by omitting dextrose and sodium succinate (No. 25), it was found that the productivity of both was significantly less than that of the present standard medium. It may be concluded, therefore, that a medium containing 1.0 percent Difco Yeast Extract, 0.5 percent Difco Proteose Peptone No. 3, and 0.1 percent dextrose (No. 23) might serve as a satisfactory substitute for the present standard medium. This medium is clear, has a slightly yellow tinge caused by the yeast extract, and does not seem to produce more surface spreaders than does the standard medium (table 1).

*Substitution of Other Peptones*

The feasibility of substituting other peptones for Proteose Peptone No. 3 (medium No. 23) was next investigated. The peptones tested were Difco Tryptone, Baltimore Biological Laboratory Trypticase, and B.B.L. Polypeptone (Nos. 29, 30, 24). It was found that any of these peptones could be substituted and that the medium containing Polypeptone yielded the greatest number of colonies when pasteurized milk was the product tested (table 2). It is of interest that with

**Table 2.** *Productivity of various test media compared with the standard medium* (*T.G.M.*)

[Test media with Difco Yeast Extract, a peptone, and dextrose as essential ingredients]

| Test medium No. | Composition of test media (percent): Difco Yeast Extract | Difco Proteose Peptone No. 3 | B.B.L. Polypeptone | Difco Tryptone | B.B.L. Trypticase | Dextrose | Agar | Product | Number samples | Geometric means: Test medium | Standard medium (T.G.M.) | Percent difference (standard=100): Pos. | Neg. | Confidence limits of percent difference (∓1.96σ) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Substitution of other peptones in medium No. 23 | | | | | | |
| 23 | 1.0 | 0.5 | | | | 0.1 | 1.5 | Past. milk | 91 | 217 | 212 | *2 | | − 1, + 6 |
| 29 | 1.0 | | | 0.5 | | .1 | 1.5 | Past. milk | 58 | 200 | 189 | 6 | | + 1, +11 |
| 30 | 1.0 | | | | 0.5 | .1 | 1.5 | Past. milk | 168 | 167 | 160 | 4 | | + 2, + 7 |
| | | | | | | | | Raw milk | 51 | 182 | 175 | 4 | | + 2, + 6 |
| 24 | 1.0 | | 0.5 | | | .1 | 1.5 | Past. milk | 207 | 226 | 206 | 10 | | + 7, +12 |
| | | | | | | | | Raw milk | 17 | 246 | 234 | 5 | | + 4, + 6 |
| | | | | | | | | Reduced quantity of B.B.L. Polypeptone in medium No. 31 | | | | | | |
| 31 | 0.8 | | 0.5 | | | 0.1 | 1.5 | Past. milk | 158 | 301 | 265 | 14 | | +10, +17 |
| 36 | .8 | | .4 | | | .1 | 1.5 | Past. milk | 51 | 317 | 274 | 16 | | +11, +21 |
| 37 | .8 | | .3 | | | .1 | 1.5 | Past. milk | 51 | 303 | 274 | 11 | | + 6, +15 |
| 38 | .8 | | .2 | | | .1 | 1.5 | Past. milk | 83 | 299 | 287 | 4 | | 0+, + 8 |

*Differences marked with an asterisk are statistically not significant (P>0.05). All other differences are significant.

pasteurized milk the Polypeptone medium (No. 24) produced significantly higher counts than did the Proteose Peptone No. 3 medium (No. 23) when these were compared directly (66 samples).

*Reduced Quantity of B.B.L. Polypeptone*

The effect of varying the amount of Polypeptone used was next studied. The four media studied contained Difco Yeast Extract, 0.8 percent; dextrose, 0.1 percent; agar, 1.5 percent; and quantities of Polypeptone which decreased decimally from 0.5 percent (No. 31) to 0.2 percent (No. 38). The quantity of Difco Yeast Extract used in these media was reduced from 1.0 to 0.8 percent because of experiments described below. Nos. 31, 36, 37, and 38 yielded significantly greater numbers of colonies than did the standard medium. However, when No. 38, containing 0.2 percent Polypeptone, was compared directly with the other three test media, it was found to yield lower counts than all of them. This difference was significant for both Nos. 31 and 36 (table 2).

*Substitution of Other Yeast Extracts*

Attempts were made to substitute other yeast products for Difco Yeast in No. 18. Fleischmann's Yeast Autolysate (No. 26), B.B.L. Yeast Extract (No. 27), and Basamin-Busch Yeast Extract of Anheuser-Busch (No. 28) were each studied separately; the other nutriments in each of the media being Proteose Peptone No. 3, 0.5 percent; and dextrose, 0.1 percent. All of these latter media were significantly inferior to the standard medium (table 3).

*Reduced Quantity of Difco Yeast Extract*

Studies were made to determine to what extent the amount of Difco Yeast Extract could be reduced and still produce a satisfactory medium with Polypeptone, 0.5 percent; and dextrose, 0.1 percent. Four media were compared with the standard medium (No. 24; No. 31, containing 0.8 percent yeast extract; No. 32, containing 0.6 percent yeast extract; No. 33, containing 0.4 percent yeast extract). All of these media might be satisfactorily substituted for the standard medium with the exception of No. 33 (0.4 percent yeast extract) which yielded about 5 percent fewer colonies than did the standard medium. This difference, however, is not statistically significant. The first three test media each yielded counts significantly greater than those of No. 33 (table 3).

*Substitution of Tryptone and Reduced Quantity of Difco Yeast Extract in Medium No. 24*

Tests were carried out to ascertain whether substitution of Difco Tryptone for Polypeptone in media with substantially reduced quan-

**Table 3.** *Productivity of various test media compared with the standard medium* (*T.G.M.*)

[Test media with Difco Yeast Extract, a peptone, and dextrose as essential ingredients]

| Test medium No. | Composition of test media (percent) | | | | | | | | | Product | Number samples | Geometric means | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Difco Yeast Extract | Fleischmann's Yeast Autolysate | B.B.L. Yeast Extract | Anheuser-Busch Yeast Extract (Basamin-Busch) | Proteose Peptone No. 3 | B.B.L. Polypeptone | Difco Tryptone | Dextrose | Agar | | | Test medium | Standard medium (T.G.M.) | Percent difference (standard=100) | | Confidence limits of percent difference (∓1.96σ) |
| | | | | | | | | | | | | | | Pos. | Neg. | |
| Substitution of other yeast extracts for Difco Yeast Extract in medium No. 18 | | | | | | | | | | | | | | | | |
| 18 | 1.5 | | | | 0.5 | | | 0.1 | 1.5 | Past. milk | 164 | 155 | 141 | 10 | | +7, +13 |
| 26 | | 1.5 | | | .5 | | | .1 | 1.5 | Past. milk | 23 | 150 | 247 | | 39 | −47, −31 |
| 27 | | | 1.5 | | .5 | | | .1 | 1.5 | Past. milk | 66 | 185 | 205 | | 10 | −15, −4 |
| 28 | | | | 1.5 | .5 | | | .1 | 1.5 | Past. milk | 30 | 148 | 200 | | 26 | −32, −20 |
| Reduced of quantity of Difco Yeast Extract in medium No. 24 | | | | | | | | | | | | | | | | |
| 24 | 1.0 | | | | | 0.5 | | 0.1 | 1.5 | Past. milk | 207 | 226 | 206 | 10 | | +7, +12 |
| 31 | .8 | | | | | .5 | | .1 | 1.5 | Past. milk | 158 | 301 | 265 | 14 | | +10, +17 |
| 32 | .6 | | | | | .5 | | .1 | 1.5 | Past. milk | 87 | 274 | 244 | 12 | | +8, +17 |
| 33 | .4 | | | | | .5 | | .1 | 1.5 | Past. milk | 87 | 233 | 244 | | *5 | −9, 0+ |
| Substitution of Tryptone and reduced quantity of Difco Yeast Extract in medium No. 24 | | | | | | | | | | | | | | | | |
| 44 | 0.5 | | | | | | 0.5 | 0.1 | 1.5 | Past. milk | 130 | 129 | 126 | *2 | | −4, +9 |
| 45 | .35 | | | | | | .5 | .1 | 1.5 | Past. milk | 97 | 123 | 127 | | *3 | −9, +3 |

*Differences marked with an asterisk are statistically not significant (P>0.05). All other differences are significant.

tity of Difco Yeast Extract would affect the results. This substitution, as is seen in the table (Nos. 44, 45), produced no substantial change (table 3).

## Media Composed of Baltimore Biological Laboratory Products[3]

The first medium (No. 19) studied contained B.B.L. Yeast Extract, 1.5 percent; B.B.L. Phytone, a plant peptone, 0.5 percent; dextrose, 0.1 percent; and sodium succinate, 0.2 percent. This medium was significantly less productive than the standard medium when tested with pasteurized milk (table 4). Another medium (No. 20) containing Polypeptone, 1.5 percent; Phytone, 0.5 percent; dextrose, 0.1 percent; and sodium succinate, 0.2 percent, was tested with both pasteurized and raw milk. The data in the table indicate that only the raw milk samples yielded significantly higher counts. An additional medium tested (No. 21), consisted of Trypticase, 1.5 percent; Phytone, 0.5 percent; dextrose, 0.5 percent; sodium citrate, 0.1 percent; and sodium chloride, 0.4 percent. This product, which was supplied by the Baltimore Biological Laboratory in powdered form and was one of two prepared media studied, was tested with pasteurized milk. The counts were significantly lower than those with the standard medium.

### *Substitution of Phytone for Yeast in Medium No. 24*

A fourth medium studied (No. 39) was modeled after No. 24 with the substitution of Phytone, 1.0 percent, for Difco Yeast, 1.0 percent. The products tested were pasteurized milk and pasteurized cream. The counts with this medium were significantly greater than those with the standard medium (table 4).

### *Changes in Ingredient Proportions in Medium No. 39*

Reduction of the quantity of Polypeptone in medium No. 39 from 0.5 to 0.4 or 0.3 percent (Nos. 40, 41) reduced the percent difference in counts to zero; further reduction in the quantity of this peptone (No. 42) resulted in lower counts than those found with the standard medium. The effect of reduction in quantity of Phytone (Nos. 43, 46) could be partially compensated for by increasing the amount of Polypeptone (No. 47).

No increase in count resulted from the addition of sodium sulfite and cystine in very small quantities to a dehydrated batch of medium No. 39 prepared by the Baltimore Biological Laboratory (No. 49) (table 4).

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[3] According to the Baltimore Biological Laboratory:
Phytone is a papaic digest of soya meal. Trypticase is a peptone derived from casein by pancreatic digestion. Polypeptone is made up of equal parts of Trypticase and Thiotone. Thiotone is a peptic hydrolysate of animal tissues.

Table 4. *Productivity of various test media compared with the standard medium* (*T.G.M.*)

[Test media with B.B.L. products]

| Test medium No. | Composition of test media (percent): B.B.L. Yeast Extract | B.B.L. Phytone | B.B.L. Polypeptone | B.B.L. Trypticase | Dextrose | Sodium succinate | Sodium citrate | Sodium chloride | Sodium sulfite | Cystine | Agar | Product | Number samples | Geometric means: Test medium | Standard medium (T.G.M.) | Percent difference (standard=100): Pos. | Neg. | Confidence limits of percent difference (∓1.96σ) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 19 | 1.5 | 0.5 | ---- | ---- | 0.1 | 0.2 | ---- | ---- | ---- | ---- | 1.5 | Past. milk | 44 | 246 | 272 | ---- | 10 | −14, −5 |
| 20 | ---- | .5 | 1.5 | ---- | .1 | .2 | ---- | ---- | ---- | ---- | 1.5 | Past. milk | 141 | 145 | 145 | *0 | ---- | −3, +3 |
| | | | | | | | | | | | | Raw milk | 59 | 174 | 161 | 8 | ---- | +5, +11 |
| 21 | ---- | .5 | ---- | 1.5 | .5 | ---- | 0.1 | 0.4 | ---- | ---- | 1.5 | Past. milk | 44 | 223 | 272 | ---- | 18 | −23, −13 |
| | Substitution of Phytone for yeast in medium No. 24 | | | | | | | | | | | | | | | | | |
| 39 | ---- | 1.0 | 0.5 | ---- | 0.1 | ---- | ---- | ---- | ---- | ---- | 1.5 | Past. milk | 145 | 145 | 137 | 6 | ---- | 0+, +12 |
| | | | | | | | | | | | | Past. cream | 95 | 99 | 91 | 9 | ---- | +5, +13 |
| | Changes in proportion of ingredients in medium No. 39 | | | | | | | | | | | | | | | | | |
| 40 | ---- | 1.0 | 0.4 | ---- | 0.1 | ---- | ---- | ---- | ---- | ---- | 1.5 | Past. milk | 81 | 120 | 120 | ---- | *0 | −8, +8 |
| 41 | ---- | 1.0 | .3 | ---- | .1 | ---- | ---- | ---- | ---- | ---- | 1.5 | Past. milk | 81 | 120 | 120 | ---- | *0 | −8, +8 |
| 42 | ---- | 1.0 | .2 | ---- | .1 | ---- | ---- | ---- | ---- | ---- | 1.5 | Past. milk | 81 | 110 | 120 | ---- | *8 | −18, +2 |
| 43 | ---- | .5 | .5 | ---- | .1 | ---- | ---- | ---- | ---- | ---- | 1.5 | Past. milk | 71 | 114 | 133 | ---- | 14 | −21, −7 |
| 46 | ---- | .35 | .5 | ---- | .1 | ---- | ---- | ---- | ---- | ---- | 1.5 | Past. milk | 38 | 112 | 143 | ---- | 22 | −32, −10 |
| 47 | ---- | .35 | 1.0 | ---- | .1 | ---- | ---- | ---- | ---- | ---- | 1.5 | Past. milk | 59 | 115 | 118 | ---- | *3 | −9, +5 |
| 49 | ---- | 1.0 | .5 | ---- | .1 | ---- | ---- | ---- | 0.04 | 0.04 | 1.5 | Past. milk | 173 | 129 | 127 | *2 | ---- | −2, +6 |

*Differences marked with an asterisk are statistically not significant (P>0.05). All other differences are significant.

## Discussion

The necessity for adequate statistical evaluation of data obtained in quantitative studies of this type cannot be too strongly emphasized. A number of previous studies in this very field have been marred by cumbersome, and sometimes inadequate or incorrect, treatment of data. The particular method used here, in addition to being statistically valid, included a "short cut" which saves much time in analysis. This "short cut," the use of class intervals of counts which correspond to equal class intervals of logarithms, may be adapted to other problems involving transformation of numbers to logarithms. Finally, the method provides a means whereby, in the absence of other governing considerations, it can readily be determined when to continue or discontinue a given series of tests and how to estimate in advance the number of tests needed to arrive at a statistically significant conclusion.

Apparently, an adequate medium for the standard plate count of dairy products must contain no less than three different nutriments. According to the data presented, these are: a yeast extract (Difco) or a plant peptone (B.B.L. Phytone); an animal peptone (any one of several); and carbohydrate (dextrose).

Despite the fact that milk product samples tested contained diverse species and numbers of bacteria, manipulation of the quantities and kinds of ingredients in the media studied was found to have predictable quantitative effects. Although such a result might be expected in pure culture studies, it was somewhat surprising in this instance. A partial explanation lies in the use in the present study of the "paired count," i. e., a direct comparison of the results obtained on both the test and standard media for each sample of milk product studied.

If and when the Standard Methods Committee selects a new medium or media for the plate count, it can determine the productivity desired and establish the quantities of ingredients which must be used to attain it.

## Summary

1. Reasons for the desirability of formulating a new standard medium for the plate count of dairy products are given.

2. Studies are described in which several satisfactory media were found.

3. One type of medium contains Difco Yeast Extract, dextrose, and a peptone or peptone mixture as essential ingredients. Yeast extracts produced by three other companies were found to be unsatisfactory for this purpose. Each of four peptones tested was found to be satisfactory. They were B.B.L. Polypeptone and Trypticase, and Difco Tryptone and Proteose Peptone No. 3. The medium con-

taining B.B.L. Polypeptone was found to produce significantly higher counts than did the one containing Proteose Peptone No. 3.

4. Another apparently satisfactory type of medium contains the plant peptone, B.B.L. Phytone, an animal peptone, and dextrose as essential ingredients.

5. It is shown that manipulation of the amounts of ingredients or substitution or omission of certain ingredients has predictable quantitative effects on the plate count.

6. A short method for testing the statistical significance of the mean difference of logarithms of paired counts is described and illustrated.

# Incidence and Distribution of *Brucella abortus* in Slaughtered Bang's Reactor Cattle

By NORMAN B. MCCULLOUGH, Ph.D., M.D.,*† C. WESLEY EISELE, M.D.,* and ANNE F. BYRNE*

In considering the occurrence of brucellosis in packing-house workers, the Bang's reactor cow has received inadequate attention. It has been frequently stated that in reactor cattle the organism is found mainly in the uterus and the udder; hence, the remainder of the carcass provides little or no exposure hazard to the worker. The prevalence of this view is somewhat surprising. It has long been known that early in the course of the disease the organism may be widely disseminated (*1*). *Brucella* has been isolated from the blood stream of cattle in a number of studies (*2, 3, 4*). Recently, Manthie and Carter performed blood cultures on artificially infected cattle (*5*). Of 270 cows, *Brucella abortus* was recovered from the blood of 172 animals. In 18 animals studied over a prolonged period, blood-stream infection persisted in over 80 percent for 5 months and in one animal for almost 2 years. These studies suggest an exposure hazard greater than that usually recognized.

More definitive information seemed to be needed on the extent of infection in a substantial number of animals actually sent for slaughter. In this study the carcasses of 100 Bang's reactor cattle were examined.

## Materials and Methods

To conduct the study, arrangements were made with one of the large packing plants in the Chicago area. Over a period of 6 months, 100 Bang's reactor cattle sent for slaughter were examined. They were unselected except for the known positive Bang's reaction. They were all of dairy breeds. The series comprised 88 cows, 9 heifers, 2 calves, and 1 bull. They were derived from herds in five Midwestern States.

During bleeding, a blood sample was obtained for an agglutination test. At various stages of the dressing process, tissues were obtained for culture. Accessible lymph nodes in widespread areas of the carcass, tonsil, and sections of liver, spleen, uterus, and membranes and fetus, if present, were obtained. Under plant conditions, the

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mammary gland was not accessible to us. Samples from all selected areas could not always be obtained. Nor was it possible to obtain tissues in an entirely aseptic manner. However, separate sterile instruments were used for obtaining each specimen which was then placed in a separate sterile screw-capped glass jar. Upon return to the laboratory, the samples were promptly cultured. Each lymph node or other tissue was trimmed of fat, seared in a flame, sectioned, and the cut surface serrated and streaked directly on the surface of Trypticase soy agar medium. Sterile instruments were used throughout. Plates were inoculated in duplicate and incubated at 37° C. in an atmosphere of 10 percent added $CO_2$.

In spite of the strict technique employed, occasional plates were overgrown with extraneous organisms and were discarded. Such tissue specimens are omitted from the tabulation of data.

Upon isolation of *Brucella*, cultures were identified by the usual methods, and the species was established by determination of $CO_2$ requirement, $H_2S$ production, growth on differential dye plates, and the use of specific absorbed typing sera. Each strain was inoculated into guinea pigs. Four weeks later the blood was tested for the presence of agglutinins; the guinea pigs were sacrificed, and cultures were made of the tissues.

Using the standardized antigen regularly employed in our laboratory (*6*) with incubation at 37° C. for 48 hours, we determined the agglutination titer by means of the standard test-tube agglutination test.

## Results

Of the 100 cattle examined, *Br. abortus* was recovered from one or more areas of the carcass in 42 animals. In 29, the organism was obtained from locations other than the uterus or supramammary lymph nodes. Table 1 presents the detailed results from the tissue cultures in these 42 animals. In ten of these, *Br. abortus* was isolated from numerous locations in widespread areas of the carcass.

All isolations of *Brucella* adhered to the characteristics of the species and typed readily by the methods mentioned. They all required $CO_2$ for initial growth. With one exception, all proved pathogenic for the guinea pig. The organism isolated from cow No. 15 failed to produce agglutinins in the guinea pig upon repeated trials and was not recovered from post-mortem cultures.

Table 2 presents the composite results of all isolations in the series tabulated according to frequency of isolation from particular tissues. Table 3 presents the distribution of *Br. abortus* in the tissues of the 42 culturally proved cases of Bang's disease. With the exception of the external iliac nodes, of which only seven specimens were obtained, and the sternal and vertebral marrow, every site cultured yielded

one or more isolations. The highest incidence of recovery was in cultures from the supramammary lymph nodes. Of 99 such specimens examined, 28.3 percent contained *Br. abortus*. The next highest incidence was in the uterus, with 15.6 percent. Although the uterus and the supramammary lymph nodes are most regularly involved, the occurrence of infection in widely scattered areas of the carcass is shown by these data.

There was some relationship between the agglutination titer and

**Table 1.** *Recovery of* Brucella abortus *from tissues of 42 Bang's reactor cattle*

| Lymph node or organ | Animal No. | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 3 | 4 | 9 | 10 | 11 | 12 | 15 | 22 | 28 | 30 | 32 | 34 | 42 | 43° |
| Atlantal | ---- | + | ---- | ---- | ---- | ---- | ---- | − | ---- | ---- | ---- | ---- | ---- | ---- |
| Parotid | − | − | − | − | − | − | − | − | + | − | − | − | − | − |
| Submaxillary | − | − | + | − | − | − | − | − | + | + | − | − | − | − |
| Tonsil | − | + | − | − | − | − | − | − | + | − | − | − | − | − |
| Retropharyngeal | − | + | − | − | − | − | − | − | + | − | − | − | − | − |
| Prescapular | ---- | ---- | − | − | − | − | − | − | + | − | − | − | − | + |
| Mediastinal | − | − | − | − | − | − | − | − | + | + | − | − | − | + |
| Bronchial | − | − | − | − | − | − | − | − | + | + | − | − | − | − |
| Splenic | − | − | − | − | − | + | − | − | + | − | − | − | − | − |
| Portal | − | − | − | − | + | − | − | − | + | − | − | − | − | − |
| Ileocecal | − | − | − | − | − | − | − | − | − | + | − | − | − | − |
| Mesenteric | − | − | − | − | − | − | − | − | − | − | − | − | − | − |
| Supramammary | + | ---- | − | + | + | + | − | + | + | − | − | − | + | + |
| Prefemoral | ---- | ---- | − | − | + | − | + | − | − | − | − | − | − | − |
| Internal iliac | − | − | − | − | − | − | − | − | + | + | − | − | − | − |
| External iliac | ---- | ---- | ---- | − | − | − | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- |
| Spleen | − | − | − | − | − | − | − | − | − | − | − | − | − | − |
| Liver | ---- | − | − | − | − | − | − | − | − | − | − | − | − | − |
| Uterus | + | + | + | + | − | + | − | − | − | − | + | + | − | − |
| Placenta | + | ---- | + | + | + | ---- | ---- | − | ---- | ---- | ---- | ---- | − | ---- |
| Membranes and/or fetus | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- |
| Sternal marrow | ---- | ---- | ---- | ---- | ---- | ---- | ---- | − | − | − | − | − | − | − |
| Vertebral marrow | ---- | ---- | ---- | ---- | ---- | ---- | ---- | − | − | − | − | − | − | − |
| | P | N | P | P | P | RP | N | P | N | P | N | RP | P | N |

| Lymph node or organ | Animal No. | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 44° | 51 | 53 | 55 | 56 | 57 | 58 | 63 | 64 | 70 | 75 | 76 | 77 | 80 |
| Atlantal | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- |
| Parotid | − | − | − | − | − | − | − | − | − | − | − | − | − | − |
| Submaxillary | − | − | − | − | − | − | − | − | − | − | − | − | − | − |
| Tonsil | − | − | − | − | − | − | − | − | − | − | − | − | − | − |
| Retropharyngeal | − | − | − | − | + | − | − | − | − | + | − | − | − | − |
| Prescapular | − | − | + | − | − | − | − | + | − | + | − | − | − | + |
| Mediastinal | − | − | − | − | − | − | − | − | − | − | − | − | − | − |
| Bronchial | + | − | − | − | − | − | − | − | − | − | − | − | − | + |
| Splenic | − | − | − | + | − | − | − | − | − | + | − | − | − | − |
| Portal | − | + | − | − | − | − | − | − | − | + | − | − | − | + |
| Ileocecal | − | − | − | − | − | − | − | − | − | − | − | − | − | + |
| Mesenteric | − | − | − | − | − | − | − | − | − | − | − | − | − | + |
| Supramammary | + | − | + | + | + | + | + | + | + | + | + | + | + | + |
| Prefemoral | − | − | + | − | − | − | − | − | − | − | − | − | − | + |
| Internal iliac | − | − | − | + | + | − | − | − | − | − | − | − | − | + |
| External iliac | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- |
| Spleen | − | − | − | − | − | − | − | − | − | + | − | − | − | − |
| Liver | − | − | − | − | − | − | − | − | − | − | − | − | − | + |
| Uterus | − | + | ---- | + | + | − | − | + | − | − | − | − | − | − |
| Placenta | ---- | ---- | ---- | ---- | ---- | − | ---- | ---- | ---- | ---- | − | − | − | − |
| Membranes and/or fetus | ---- | ---- | ---- | ---- | ---- | − | ---- | ---- | ---- | ---- | − | − | − | − |
| Sternal marrow | − | − | − | − | − | − | ---- | ---- | ---- | − | ---- | ---- | ---- | ---- |
| Vertebral marrow | − | − | − | − | − | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- |
| | N | N | N | N | N | P | N | N | N | N | P | P | P | P |

+ = positive; − = negative; ° = calf; P = pregnant; N = nonpregnant; RP = recent parturition; *Positive culture from membranes.

Table 1. *Recovery of* Brucella abortus *from tissues of 42 Bang's reactor cattle*—Con.

| Lymph node or organ | Animal No | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 81 | 82 | 83 | 84 | 88 | 89 | 90 | 92 | 93 | 94 | 96 | 97 | 98 | 100 |
| Atlantal | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- |
| Parotid | − | − | − | − | − | − | − | − | − | − | − | − | − | − |
| Submaxillary | − | − | − | − | − | − | − | − | − | − | − | − | + | − |
| Tonsil | − | − | − | − | − | − | − | + | − | − | − | + | − | − |
| Retropharyngeal | − | − | − | − | − | − | − | − | + | + | + | − | + | − |
| Prescapular | − | − | + | + | + | − | − | − | − | − | − | − | − | − |
| Mediastinal | − | + | − | − | − | − | ---- | − | − | − | − | − | + | − |
| Bronchial | + | + | + | − | − | − | + | − | − | − | − | − | − | − |
| Splenic | − | + | − | − | − | ---- | − | − | − | − | − | − | + | ---- |
| Portal | + | − | − | − | − | − | − | − | − | − | − | − | − | − |
| Ileocecal | + | + | − | + | − | − | − | − | − | − | − | − | − | ---- |
| Mesenteric | − | + | − | + | − | − | − | − | − | − | − | − | − | − |
| Supramammary | − | − | + | + | + | + | − | − | − | − | + | − | + | + |
| Prefemoral | + | + | − | + | − | − | − | − | − | − | − | − | − | − |
| Internal iliac | − | − | + | + | + | − | − | − | − | − | − | − | + | + |
| External iliac | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- |
| Spleen | − | − | − | − | − | − | − | − | − | − | − | − | − | + |
| Liver | + | + | − | − | − | − | − | − | − | − | − | − | − | − |
| Uterus | − | + | + | − | + | ---- | − | − | − | − | + | − | − | − |
| Placenta | ---- | − | + | ---- | ---- | ---- | − | ---- | − | ---- | ---- | − | − | − |
| Membranes and/or fetus | ---- | − | *+ | ---- | ---- | ---- | ---- | ---- | − | ---- | ---- | − | − | − |
| Sternal marrow | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- |
| Vertebral marrow | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- |
| | N | P | P | N | N | N | P | RP | P | N | N | P | P | P |

+=positive; −=negative; P=pregnant; N=nonpregnant; RP=recent parturition; *Positive culture from membranes.

Table 2. *Frequency of isolation of* Brucella abortus *from certain tissues of 100 Bang's reactor cattle*

| Lymph node or organ | Number cultured | Number positive | Percent positive | Lymph node or organ | Number cultured | Number positive | Percent positive |
|---|---|---|---|---|---|---|---|
| Atlantal | 8 | 1 | 12.5 | Supramammary | 99 | 28 | 28.3 |
| Parotid | 100 | 1 | 1.0 | Prefemoral | 95 | 7 | 7.3 |
| Submaxillary | 100 | 4 | 4.0 | Internal iliac | 99 | 10 | 10.1 |
| Tonsil | 99 | 4 | 4.0 | External iliac | 7 | 0 | .0 |
| Retropharyngeal | 100 | 8 | 8.0 | Spleen | 99 | 2 | 2.0 |
| Prescapular | 95 | 9 | 9.5 | Liver | 95 | 3 | 3.1 |
| Mediastinal | 93 | 5 | 5.4 | Uterus | 96 | 15 | 15.6 |
| Bronchial | 95 | 8 | 8.4 | Placenta | 48 | 5 | 10.4 |
| Splenic | 97 | 6 | 6.2 | Membranes and/or fetus | 28 | *1 | 3.6 |
| Portal | 97 | 6 | 6.2 | Sternal marrow | 49 | 0 | .0 |
| Ileocecal | 97 | 5 | 5.1 | Vertebral marrow | 40 | 0 | .0 |
| Mesenteric | 100 | 3 | 3.0 | | | | |

*Positive culture from membranes.

Table 3. *Distribution of* Brucella abortus *in tissues of 42 cattle with culturally proved Bang's disease*

| Lymph node or organ | Number cultured | Number positive | Percent positive | Lymph node or organ | Number cultured | Number positive | Percent positive |
|---|---|---|---|---|---|---|---|
| Atlantal | 2 | 1 | -------- | Supramammary | 41 | 28 | 68.3 |
| Parotid | 42 | 1 | 2.4 | Prefemoral | 40 | 7 | 17.5 |
| Submaxillary | 42 | 4 | 9.5 | Internal iliac | 42 | 10 | 23.8 |
| Tonsil | 42 | 4 | 9.5 | External iliac | 3 | 0 | -------- |
| Retropharyngeal | 42 | 8 | 19.0 | Spleen | 42 | 2 | 4.8 |
| Prescapular | 40 | 9 | 22.5 | Liver | 41 | 3 | 7.3 |
| Mediastinal | 41 | 5 | 12.2 | Uterus | 40 | 15 | 37.5 |
| Bronchial | 42 | 8 | 19.0 | Placenta | 18 | 5 | 27.8 |
| Splenic | 40 | 6 | 15.0 | Membranes and/or fetus | 11 | *1 | 9.1 |
| Portal | 42 | 6 | 14.3 | Sternal marrow | 14 | 0 | .0 |
| Ileocecal | 41 | 5 | 12.2 | Vertebral marrow | 12 | 0 | .0 |
| Mesenteric | 42 | 3 | 7.1 | | | | |

*Positive culture from membranes.

the recovery of *Brucella*. All of the animals examined proved to be positive reactors with 80 percent giving titers of 1:640 or higher. Recoveries were made more consistently in the animals with high titers; 92 percent of the culturally positive animals had titers of 1:640 or higher. Titers of 1:2560 or higher occurred twice as frequently in the animals from which *Brucella* was recovered as in the culturally negative animals. An analysis of the relationship of the agglutination titer to pregnancy or nonpregnancy revealed no significant difference. Likewise, the incidence of recovery of the organism was not significantly different in these two groups.

## Comment

The failure to recover *Brucella* in 58 of the 100 animals is not surprising. It is probable that a number of these cattle were sent for slaughter because they were no longer profitable and may represent long-term infections. In such cases, infection may be limited to a few localized areas. That one may fail to include such a localized infected area in a cultural sampling of the carcass may be expected. Even a known infected lymph node will not yield the organism unless the infected portion of the node is sectioned and streaked upon the plate. It is interesting to speculate whether some of the animals studied may have been reactors as a result of vaccination.

The predominance of the recoveries of *Brucella* from the uterus and the supramammary lymph nodes is in accord with previous experience.

The isolation of *Brucella abortus* from numerous sites in a significant number of the animals examined emphasizes the potential exposure to *Brucella* encountered by personnel engaged in processing the carcasses of Bang's reactor cattle.


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# Charcoal Agar Culture Medium for Preparing *Hemophilus pertussis* Vaccine

By H. M. POWELL, C. G. CULBERTSON, and P. W. ENSMINGER *

In 1947, Powell, while on a visit to the Lister Institute, talked over briefly with Sir Paul Fildes some of the prevailing difficulties of large scale culturing of *Hemophilus pertussis*. Use of charcoal in place of the blood in the culture medium was suggested by Fildes. At about this time, Pollock (*1*) reported from the laboratories of the Lister Institute that charcoal could replace blood in pertussis culture media, and that the active fraction of blood was found to be the albumin fraction which neutralized the toxic action of fatty acids.

During the past year we have tried charcoal agar for growing mass cultures of *H. pertussis* to produce vaccine. Our use of charcoal agar followed preliminary experiments in making charcoal broth by suspending charcoal in cellophane bags, in dialyzing thimbles, and in masses of agar, and so forth, and placing each, in turn, in Cohen-Wheeler broth. Growth of *H. pertussis* increased greatly.

As an agar base we have used the pertussis fluid culture medium described by Cohen-Wheeler (*2*). To this medium we have added 2 to 3 percent agar and 0.4 percent charcoal (Norite sg.). The complete medium, quite black in color, is put into large test tubes to make slants for phase I stock cultures, and into "toxin bottles" (New York State Department of Health pyrex bottles used commonly for diphtheria toxin preparation) or any other desirable bottles for growing mass cultures. The tubes and bottles are subjected to ordinary autoclave sterilization for one-half hour. Length of autoclaving will generally depend on the size and number of bottles loaded into the autoclave and also on the size of the autoclave. For these reasons, fixed rules for autoclaving can hardly be given except to state that minimum heating to effect sterilization is preferable.

We regulate the temperature for incubating cultures to 35° to 36° C. There is some slight indication that this level is preferable to 37° to 38° C. Some variation in temperature is usual in most large incubators according to our experience and the personal inquiries we have made.

*H. pertussis* grows luxuriantly on charcoal agar, and in gram-stained smears the organisms are quite small gram-negative rods in

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24- or 48-hour cultures. Saline suspensions of such cultures agglutinate to high titer (1:5000 to 1:10,000) in phase I rabbit antiserum, and positive Dold reactions are produced in rabbit skin. Cultures of *H. pertussis* on charcoal agar fulfill the criteria for S forms as indicated by Shibley and Hoelscher (*3*) except insofar as charcoal may substitute for blood in the culture medium previously specified by definition for growing S forms.

Freshly isolated cultures of *H. pertussis*, or vaccine strains of proved antigenicity under the customary dehydration, which are cultivated on charcoal agar, produce, in most instances, vaccine of acceptable potency when assayed by the current National Institutes of Health (N.I.H.) mouse immunity and toxicity tests. We have subcultured some of these strains for as many as 15 or 20 generations on charcoal agar slants, and, at this time, have prepared vaccine on charcoal agar bottles. This vaccine, in most cases, passes the N.I H. test. Some occasional strains of *H. pertussis* which have been unsatisfactory vaccine producers in the Cohen-Wheeler broth have promptly produced satisfactory vaccine when cultured on charcoal agar.

Of the *H. pertussis* cultures used, 40103 and 41405 were supplied to us by Dr. Harold Lyall of the New York State Department of Health Laboratories; 3722, 3734, and 3739 were Lilly Laboratory strains originally obtained from Dr. Pearl Kendrick; W7, Cooper, Corbin, Newton, and Rainey were newly isolated strains from Dr. Dwain Walcher.

Listed in the table are the results of N I.H mouse immunization tests using the standard methods with 42 lots of vaccine made with 10 different cultures. Several repeat lots of vaccine were made with the same seed culture generation to test repeatability of results. Of the 42 lots, 37 were equal to or better than the reference vaccine: 5 lots, marked by parentheses, were inferior to the reference vaccine; however, 3 of the 5 were close to the potency of the reference vaccine, while 2 were very inferior for reasons not known. Basis for comparing these vaccines is their $ED_{50}$ value which is the amount of vaccine necessary to confer immunity on 50 percent of the mice challenged by intracerebral injection of 100,000 *H. pertussis*, the $LD_{50}$ of which is 1,000 organisms or less.

Seven lots of the charcoal agar vaccine, marked in the table, were very much better than the reference vaccine. However, precise computation was not possible since the results fell outside the optimum limits in relation to vaccine dosage, and so forth. In one case, the same was true of the N.I.H. reference vaccine (see table).

This brief report has been prepared because the growth of phase I strains on charcoal agar appears so luxuriant and suffices as potent vaccine. Furthermore, a good many subcultures may be made on charcoal agar without degrading the strain as a good vaccine producer.

*Results of N.I.H. Mouse Immunization Tests*

| Lot No. of vaccine | Vaccine made from charcoal agar subculture number: | *H. pertussis* strain | $ED_{50}$ of vaccine (x 1 million) | $ED_{50}$ of reference vaccine N.I.H. No. 4 (x 1 million) |
|---|---|---|---|---|
| 921 | 10 | W7 | 94 | 472 |
| 883 | 6 | 3722 | 102 | 268 |
| 887 | 7 | 3722 | 303 | 463 |
| 851 | 5 | 3734 | [1] 33 | [2] 81 |
| 923 | 10 | 3734 | 195 | 472 |
| 939 | 20 | 3734 | 92 | 383 |
| 847 | 5 | 3739 | 277 | 488 |
| 893 | [3] 5 | 3739 | 331 | 752 |
| 873 | 6 | 3739 | [1] 51 | 173 |
| 953 | [3] 6 | 3739 | (415) | 353 |
| 849 | 7 | 3739 | 381 | 463 |
| 851 | [3] 7 | 3739 | 61 | 173 |
| 897 | 8 | 3739 | [1] 33 | 240 |
| 899 | [3] 8 | 3739 | [1] 88 | 240 |
| 853 | 9 | 3739 | 207 | 240 |
| 855 | [3] 9 | 3739 | (720) | 240 |
| 919 | 10 | 3739 | (218) | 197 |
| 857 | 11 | 3739 | 157 | 463 |
| 859 | [3] 11 | 3739 | [1] 33 | 463 |
| 861 | 13 | 3739 | 194 | 240 |
| 863 | [3] 13 | 3739 | 126 | 240 |
| 865 | 15 | 3739 | [1] 43 | 240 |
| 867 | [3] 15 | 3739 | [1] 176 | 488 |
| 801 | 5 | 3739 and 41405 | 239 | 300 |
| 813 | [3] 5 | 3739 and 41405 | 514 | 574 |
| 819 | [3] 5 | 3739 and 41405 | 185 | 221 |
| 819A | [3] 5 | 3739 and 41405 | 217 | 238 |
| 821 | [3] 5 | 3739 and 41405 | 132 | 238 |
| 823 | 6 | 3739 and 41405 | 123 | 224 |
| 837 | [3] 6 | 3739 and 41405 | 228 | 240 |
| 839 | [3] 6 | 3739 and 41405 | 185 | 259 |
| 891 | 8 | 40103 | 272 | 463 |
| 843 | 5 | Cooper | 90 | 259 |
| 947 | 6 | do | 206 | 472 |
| 927 | 10 | do | 128 | 472 |
| 943 | 20 | do | (530) | 236 |
| 907 | 4 | Corbin | 191 | 240 |
| 959 | 7 | do | 100 | 472 |
| 925 | 10 | do | 57 | 197 |
| 941 | 20 | do | 160 | 472 |
| 909 | 4 | Newton | (290) | 240 |
| 977 | 4 | Rainey | 200 | 472 |

[1] Much superior to reference vaccine.
[2] Results outside the optimum limits of vaccine dosage.
[3] Repeat lots of vaccine made.

A few tests not reported here appear to indicate that the Cohen-Wheeler base for the charcoal agar medium may be simplified somewhat since the medium ingredients are not included in the vaccine as is the case with broth.

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# Incidence of Disease

*No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring*

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## UNITED STATES

### Reports From States for Week Ended February 24, 1951

*Measles.* The total number of new cases of measles reported for the current week was 14,918 which is 80 percent greater than the number reported for the same week last year. The States reporting the largest number of cases for the current week were Texas, 2,968; California, 1,637; Colorado, 801; Wisconsin, 736; and Pennsylvania, 634.

*Influenza.* The total number of cases of influenza reported for the current week was 6,149, as compared with 6,007 for the same week last year and 4,204 for a 5-year median. California reported 107 cases for the current week, but official reports indicate that the incidence is subsiding in previously reported areas. However, mild respiratory infections are prevalent in some other parts of the State. There are no official reports of epidemics of influenza occurring presently in areas other than California and the northeastern section of the country in which the diagnosis has been confirmed by isolation of the influenza virus or by serological tests. The total number of deaths reported in 106 large cities of the country, although slightly above the median, does not indicate any significant increase which might be attributed to influenza. The cities in the Middle Atlantic States which showed an increase of 7 percent in the number of deaths for the week ended February 17, increased only 0.5 percent during the current week.

### NIH Influenza Information Center

The regional laboratory at the California Department of Public Health reports that 109 paired serum specimens have been examined for influenza from January 1 to February 16, 1951. Of these, 35 showed a significant rise in titer by the complement fixation test. In those tested by the hemagglutination inhibition test, the infecting virus was identified as belonging to the A-prime subgroup.

Dr. George K. Hirst of the Public Health Research Institute of New York City, reports the isolation of nine strains from throat washings taken on February 17 from mild cases of influenza occurring in the Bronx Veterans' Hospital. Three of these strains have been typed and were found to be closely related to the FM–1 strain.

Dr. A. S. Lazarus of the University of Washington, Seattle, reports that paired serum specimens from a single patient at the University infirmary showed a diagnostically significant increase in titer for influenza A-prime by both complement fixation and hemagglutination inhibition tests. This is the first identification of influenza reported in this area this winter, but there is no evidence of widespread distribution of the disease on the campus.

The Department of Virus and Rickettsial Diseases of the Army Medical Service Graduate School reports the isolation of a strain of virus of the A-prime group which, with rooster antiserum, resembles the Cuppett strain. This was recovered from a member of the armed forces stationed in Greenland. Of seven paired sera from an Air Force base in Labrador, six were positive in the hemagglutination inhibition test for the general A group.

The Division of Preventive Medicine, Office of the Surgeon General of the Air Force, reports that one paired serum from an Air Force base in New Mexico showed rise in hemagglutination inhibition titer for A and A-prime.

The Regional Laboratory at the Boston City Hospital (Dr. Maxwell Finland) reports isolation of four strains of virus from recent cases. Two of these, from a laboratory worker and from an interne, resembled the PR-8 strain when tested with rabbit antisera. They were found to infect the allantoic cavity of chick embryo on primary passage. Two other strains isolated from patients in the hospital resembled the FM-1 strain.

*Comparative Data for Cases of Specified Reportable Diseases: United States*

[Numbers after diseases are International List numbers, 1948 revision]

| Disease | Total for week ended— | | 5-year median 1946-50 | Seasonal low week | Cumulative total since seasonal low week | | 5-year median 1945-46 through 1949-50 | Cumulative total for calendar year— | | 5-year median 1946-50 |
|---|---|---|---|---|---|---|---|---|---|---|
| | Feb. 24, 1951 | Feb. 25, 1950 | | | 1950-51 | 1949-50 | | 1951 | 1950 | |
| Anthrax (062) | 3 | ------ | 2 | (1) | (1) | (1) | (1) | 13 | 2 | 11 |
| Diphtheria (055) | 96 | 150 | 211 | 27th | [2] 3,684 | 5,617 | 8,171 | [2] 777 | 1,316 | 1,813 |
| Encephalitis, acute infectious (082) | 14 | 16 | 7 | (1) | (1) | (1) | (1) | 86 | 89 | 61 |
| Influenza (480-483) | 6,149 | 6,007 | 4,204 | 30th | 40,359 | 36,751 | 36,751 | 25,817 | 26,167 | 26,167 |
| Measles (085) | 14,916 | 8,172 | 15,725 | 35th | 114,097 | 64,131 | 95,323 | 85,396 | 45,001 | 69,199 |
| Meningitis, meningococcal (057.0) | 115 | 85 | 85 | 37th | 1,820 | 1,609 | 1,609 | 559 | 696 | 696 |
| Pneumonia (490-493) | 2,019 | 2,457 | ----- | (1) | (1) | (1) | (1) | 14,336 | 18,659 | ----- |
| Poliomyelitis, acute (080) | 90 | 96 | 40 | 11th | 33,216 | 42,365 | 25,284 | 997 | 891 | 487 |
| Rocky Mountain spotted fever (104) | ------ | ------ | ------ | (1) | (1) | (1) | (1) | 2 | 6 | 5 |
| Scarlet fever (050)[3] | 2,365 | 1,862 | 2,868 | 32d | 33,429 | 30,277 | 44.553 | 17,738 | 13,838 | 20,705 |
| Smallpox (084) | ------ | 1 | 3 | 35th | 14 | 19 | 46 | 6 | 10 | 25 |
| Tularemia (059) | 9 | 20 | 21 | (1) | (1) | (1) | (1) | 114 | 186 | 186 |
| Typhoid and paratyphoid fever (040,041)[4] | 31 | 46 | 40 | 11th | 3,220 | 3,736 | 3,736 | 305 | 363 | 333 |
| Whooping cough (056) | 1,604 | 2,447 | 2,251 | 39th | 34,715 | 41,034 | 41,034 | 13,113 | 19,498 | 17,994 |

[1] Not computed. [2] Deduction: Mississippi, week ended Jan. 27, 1 case. [3] Including cases reported as streptococcal sore throat. [4] Including cases reported as salmonellosis.

## Reported Cases of Selected Communicable Diseases: United States, Week Ended Feb. 24, 1951

[Numbers under diseases are International List numbers, 1948 revision]

| Area | Diphtheria (055) | Encephalitis, infectious (082) | Influenza (480–483) | Measles (085) | Meningitis, meningococcal (057.0) | Pneumonia (490–493) | Poliomyelitis (080) |
|---|---|---|---|---|---|---|---|
| **United States** | 96 | 14 | 6,149 | 14,918 | 115 | 2,019 | 90 |
| **New England** | 1 | | 301 | 822 | 3 | 84 | |
| Maine | | | 164 | 154 | | 15 | |
| New Hampshire | | | 40 | 176 | | 5 | |
| Vermont | | | 60 | 139 | | | |
| Massachusetts | 1 | | | 266 | 3 | | |
| Rhode Island | | | 2 | 1 | | | |
| Connecticut | | | 35 | 86 | | 64 | |
| **Middle Atlantic** | 4 | 2 | 77 | 1,673 | 17 | 360 | 5 |
| New York | 1 | 1 | [1] 49 | 516 | 7 | 111 | 5 |
| New Jersey | 1 | 1 | 28 | 523 | 4 | 125 | |
| Pennsylvania | 2 | | | 634 | 6 | 124 | |
| **East North Central** | 8 | 5 | 54 | 2,308 | 16 | 185 | 5 |
| Ohio | 2 | | | 434 | 4 | | |
| Indiana | 2 | | | 113 | 1 | 5 | |
| Illinois | 3 | 2 | 11 | 589 | 6 | 106 | 1 |
| Michigan | 1 | 3 | 43 | 436 | 2 | 74 | 3 |
| Wisconsin | | | | 736 | 3 | | 1 |
| **West North Central** | 6 | | 19 | 975 | 6 | 39 | 9 |
| Minnesota | 3 | | 2 | 92 | 1 | 4 | |
| Iowa | | | | 42 | 4 | | 3 |
| Missouri | 2 | | 2 | 418 | 1 | | 1 |
| North Dakota | | | 8 | 96 | | 22 | |
| South Dakota | 1 | | | 4 | | | 3 |
| Nebraska | | | 4 | 12 | | | 1 |
| Kansas | | | 3 | 311 | | 13 | 1 |
| **South Atlantic** | 29 | | 1,773 | 1,514 | 20 | 242 | 15 |
| Delaware | | | | 18 | | | |
| Maryland | 1 | | 2 | 67 | 1 | 50 | |
| District of Columbia | | | 1 | 48 | | 6 | 1 |
| Virginia | | | 755 | 309 | 5 | 132 | |
| West Virginia | 2 | | 327 | 277 | | 19 | 3 |
| North Carolina | 12 | | | 233 | 4 | | 4 |
| South Carolina | 10 | | 348 | 13 | 7 | 11 | |
| Georgia | 4 | | 340 | 470 | 1 | 24 | 2 |
| Florida | | | | 79 | 2 | | 5 |
| **East South Central** | 19 | 2 | 1,344 | 452 | 16 | 42 | 6 |
| Kentucky | 1 | | 4 | 174 | 4 | 7 | 2 |
| Tennessee | 6 | | 91 | 65 | 3 | | |
| Alabama | 8 | 2 | 1,201 | 45 | 8 | | 2 |
| Mississippi | 4 | | 48 | 168 | 1 | 35 | 2 |
| **West South Central** | 22 | | 1,458 | 3,685 | 23 | 873 | 16 |
| Arkansas | 2 | | 441 | 314 | | 74 | |
| Louisiana | 1 | | 896 | 156 | 1 | 61 | 2 |
| Oklahoma | 3 | | 121 | 247 | 6 | 37 | 1 |
| Texas | 16 | | | 2,968 | 16 | 701 | 13 |
| **Mountain** | 1 | 3 | 608 | 1,293 | 1 | 93 | 12 |
| Montana | | | 29 | 54 | | 6 | |
| Idaho | | | | 42 | | | 2 |
| Wyoming | | 2 | | 43 | | 7 | 1 |
| Colorado | | | 30 | 801 | 1 | 22 | 2 |
| New Mexico | | 1 | | 49 | | 6 | 1 |
| Arizona | 1 | | 529 | 272 | | 52 | 6 |
| Utah | | | | 25 | | | |
| Nevada | | | 20 | 7 | | | |
| **Pacific** | 6 | 2 | 515 | 2,196 | 13 | 101 | 22 |
| Washington | | | 140 | 542 | 3 | 2 | 3 |
| Oregon | 1 | | 268 | 17 | | 32 | 4 |
| California | 5 | 2 | 107 | 1,637 | 10 | 67 | 15 |
| Alaska | | | | | | | |
| Hawaii | | | 12 | | | | |

[1] New York City only.

*Anthrax:* Pennsylvania, 2 cases; New Jersey, 1 case.

## Reported Cases of Selected Communicable Diseases: United States, Week Ended Feb. 24, 1951—Continued

[Numbers under diseases are International List numbers, 1948 revision]

| Area | Rocky Mountain spotted fever (104) | Scarlet fever (050) | Smallpox (084) | Tularemia (059) | Typhoid and paratyphoid fever [1] (040, 041) | Whooping cough (056) | Rabies in animals |
|---|---|---|---|---|---|---|---|
| **United States** | - | 2,365 | - | 9 | 31 | 1,604 | 114 |
| **New England** | - | 209 | - | - | - | 158 | - |
| Maine | - | 20 | - | - | - | 48 | - |
| New Hampshire | - | 8 | - | - | - | 8 | - |
| Vermont | - | 2 | - | - | - | 24 | - |
| Massachusetts | - | 132 | - | - | - | 51 | - |
| Rhode Island | - | 9 | - | - | - | 19 | - |
| Connecticut | - | 38 | - | - | - | 8 | - |
| **Middle Atlantic** | - | 387 | - | - | 5 | 238 | 18 |
| New York | - | [2] 189 | - | - | - | 74 | 18 |
| New Jersey | - | 68 | - | - | 1 | 70 | - |
| Pennsylvania | - | 130 | - | - | 4 | 94 | - |
| **East North Central** | - | 672 | - | 1 | 6 | 235 | 4 |
| Ohio | - | 142 | - | - | 1 | 52 | 1 |
| Indiana | - | 78 | - | - | 4 | 21 | - |
| Illinois | - | 124 | - | 1 | - | 19 | 1 |
| Michigan | - | 276 | - | - | 1 | 82 | 2 |
| Wisconsin | - | 52 | - | - | - | 61 | - |
| **West North Central** | - | 137 | - | 1 | - | 83 | 8 |
| Minnesota | - | 35 | - | - | - | 18 | 1 |
| Iowa | - | 21 | - | - | - | 8 | 6 |
| Missouri | - | 30 | - | 1 | - | 6 | - |
| North Dakota | - | 2 | - | - | - | 13 | - |
| South Dakota | - | 5 | - | - | - | 9 | - |
| Nebraska | - | 11 | - | - | - | 2 | - |
| Kansas | - | 33 | - | - | - | 27 | 1 |
| **South Atlantic** | - | 217 | - | 1 | 6 | 264 | 26 |
| Delaware | - | 7 | - | - | - | - | - |
| Maryland | - | 22 | - | - | - | 11 | - |
| District of Columbia | - | 12 | - | - | 2 | 10 | - |
| Virginia | - | 30 | - | - | - | 84 | 6 |
| West Virginia | - | 5 | - | - | 1 | 66 | 7 |
| North Carolina | - | 94 | - | - | 1 | 42 | - |
| South Carolina | - | 12 | - | - | 1 | 4 | 8 |
| Georgia | - | 15 | - | - | 1 | 24 | 4 |
| Florida | - | [2] 20 | - | 1 | - | 23 | 1 |
| **East South Central** | - | 73 | - | 3 | 2 | 42 | 36 |
| Kentucky | - | 20 | - | - | 1 | 23 | 12 |
| Tennessee | - | 41 | - | - | 1 | 5 | 13 |
| Alabama | - | 6 | - | 2 | - | 11 | 11 |
| Mississippi | - | 6 | - | 1 | - | 3 | - |
| **West South Central** | - | 84 | - | 3 | 5 | 405 | 22 |
| Arkansas | - | 4 | - | 2 | 2 | 78 | 3 |
| Louisiana | - | 17 | - | 1 | - | 5 | - |
| Oklahoma | - | 9 | - | - | - | 23 | - |
| Texas | - | 54 | - | - | 3 | 299 | 19 |
| **Mountain** | - | 234 | - | - | 1 | 137 | - |
| Montana | - | 8 | - | - | - | 6 | - |
| Idaho | - | 86 | - | - | - | 8 | - |
| Wyoming | - | - | - | - | - | 4 | - |
| Colorado | - | 27 | - | - | - | 18 | - |
| New Mexico | - | 5 | - | - | 1 | 55 | - |
| Arizona | - | 7 | - | - | - | 43 | - |
| Utah | - | [2] 101 | - | - | - | 3 | - |
| Nevada | - | - | - | - | - | - | - |
| **Pacific** | - | 352 | - | - | 6 | 42 | - |
| Washington | - | 93 | - | - | - | 8 | - |
| Oregon | - | 50 | - | - | - | 5 | - |
| California | - | [2] 209 | - | - | 6 | 29 | - |
| Alaska | - | - | - | - | - | - | - |
| Hawaii | - | 5 | - | - | - | - | - |

[1] Including cases reported as salmonellosis.
[2] Including cases reported as streptococcal sore throat.

# FOREIGN REPORTS

## CANADA

*Reported Cases of Certain Diseases—Week Ended Feb. 10, 1951*

| Disease | Total | New-foundland | Prince Edward Island | Nova Scotia | New Brunswick | Quebec | Ontario | Manitoba | Saskatchewan | Alberta | British Columbia |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Brucellosis | 2 | | | | | | | 1 | | | 1 |
| Chickenpox | 1,441 | | | 57 | 1 | 221 | 766 | 43 | 68 | 141 | 144 |
| Diphtheria | 3 | | | | | 2 | 1 | | | | |
| Dysentery, bacillary | 7 | | | | | 4 | | 1 | | | 2 |
| German measles | 336 | | | 19 | | 31 | 180 | 1 | 12 | 44 | 49 |
| Influenza | 6,300 | 476 | | 2,710 | 46 | 554 | 51 | 5 | 286 | | 2,172 |
| Measles | 2,575 | 5 | | 43 | 5 | 232 | 2,048 | 145 | 23 | 26 | 48 |
| Meningitis, meningococcal | 1 | | | | | | | | | | 1 |
| Mumps | 1,496 | 3 | | 21 | 1 | 180 | 539 | 37 | 151 | 317 | 247 |
| Poliomyelitis | 1 | | | | | | | 1 | | | |
| Scarlet fever | 312 | | | 5 | | 51 | 49 | 18 | 22 | 91 | 76 |
| Tuberculosis (all forms) | 172 | 8 | | 4 | 6 | 42 | 20 | 14 | 3 | 32 | 43 |
| Typhoid and paratyphoid fever | 9 | | | | | 3 | 1 | | | 5 | |
| Venereal diseases: | | | | | | | | | | | |
| Gonorrhea | 274 | 6 | | 6 | 3 | 74 | 39 | 21 | 6 | 30 | 89 |
| Syphilis | 128 | 7 | | 13 | 8 | 46 | 18 | 9 | 9 | 3 | 15 |
| Primary | 6 | | | | | 2 | 2 | | 1 | | 1 |
| Secondary | 4 | | | | | 1 | | | 2 | 1 | |
| Other | 118 | 7 | | 13 | 8 | 43 | 16 | 9 | 6 | 2 | 14 |
| Other forms | 2 | | | | | | | | | | 2 |
| Whooping cough | 219 | | | | 32 | 41 | 82 | 8 | 4 | 3 | 49 |

## REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

The following reports include only items of unusual incidence or special interest and the occurence of these diseases, except yellow fever, in localities which had not recently reported cases. All reports of yellow fever are published currently. A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

### Cholera

*India.* During the week ended February 17, 1951, 96 cases of cholera were reported in Calcutta, compared with 82 and 71 for the weeks ended February 3 and 10, respectively. For the week ended February 17, Negapatam reported 10 cases and Madras reported 7.

*India (French).* For the week ended February 3, 1951, cholera was reported in seaports as follows: Karikal eight cases and Pondicherry nine.

*India.* During the week ended February 17, 1951, 637 cases of smallpox were reported in Calcutta as compared with 430 for the

### Smallpox

previous week. The figure for February 17 is larger than that for any week during 1949 and 1950. The cumulative number of cases (3,115) for the first 7 weeks of 1951 was more than twice the number (1,261) for the corresponding period in 1950. During the same period in 1949 less than 200 cases were reported. For the week ended February 17, Madras and Bombay reported 79 and 72 cases, respectively. In Nagpur the indications are that the smallpox epidemic has reached its peak since 108 cases were reported for the week ended February 10 as compared with 204 for the previous week.

*India (French).* During the week ended February 3, 1951, 91 cases of smallpox were reported in Pondicherry.

*Pakistan.* For the week ended February 17, 1951, nine cases of smallpox were reported in Karachi as compared with two for the previous week.

### Yellow Fever

*Brazil.* The outbreak of jungle yellow fever in Goiaz State has spread to counties in the eastern and southern part of the State. The area involved is one which has been opened for settlement during the past 3 or 4 years. During this period the population increased from 10,000 to approximately 200,000. An estimated 2,000 cases (400 deaths) have occurred during the current outbreak.

## Plague Infection in Lea County, N. Mex.

A report dated February 19, 1951, states that plague infection was proved positive in a specimen of 16 fleas taken from 8 harvest mice, *Onychomy leucogaster*, trapped about 5 miles east of Eunice in Lea County on January 30, 1951.

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The printing of this publication has been approved by the Director of the Bureau of the Budget (August 10, 1949).

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It contains (1) current information regarding the incidence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

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# Public Health Reports

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FEDERAL SECURITY AGENCY

PUBLIC HEALTH SERVICE

FEDERAL SECURITY AGENCY
*Oscar R. Ewing, Administrator*

PUBLIC HEALTH SERVICE
*Leonard A. Scheele, Surgeon General*

Division of Public Health Methods
*G. St. J. Perrott, Chief of Division*

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# Public Health Reports

*Vol. 66* • MARCH 23, 1951 • *No. 12*

## Statistical Studies of Heart Disease

### IX. Race and Sex Differences in the Trend of Mortality From the Major Cardiovascular-Renal Diseases

By I. M. MORIYAMA and THEODORE D. WOOLSEY*

Several of the extraneous factors influencing the trend of mortality from diseases of the heart and other cardiovascular-renal diseases were discussed in the second report of this series (*1*). Among these were: (1) the changes in the death registration area of the United States since 1900; and (2) the changes in classification procedures and medical certification. It was pointed out that the incompleteness of the registration area prior to 1933 introduced a bias in the measurement of the trend which was impossible to eliminate entirely. The same was true of the bias caused by changes in classification, form of medical certification on the death certificate, and medical knowledge and habits of diagnosis on the part of the certifying physicians. However, much of the disturbance from these latter sources was felt to be eliminated, at the expense of some specificity, by grouping the various so-called cardiovascular-renal diseases and studying the trend of the broad group. The effect of shifts in the age composition of the population was relatively easily controlled by the use of age-adjusted and age-specific death rates.

In the discussion of the trend of broad disease groupings, it was stated that "for the group of diseases which reflect damage to the heart, kidneys, and arterial system resulting from hypertension and arteriosclerosis the basic risk of dying for persons over 35 years of age is neither rising nor falling." While this statement holds true for the entire group of persons who have passed their 35th birthday, when trends for males and females and for white and nonwhite persons are examined separately, some striking differences appear. These differences are the subject of the present report.

Since the incompleteness of the registration area in the earlier years

*Biostatisticians, National Office of Vital Statistics and Division of Public Health Methods. This is the last in a series of papers dealing with statistics of heart disease morbidity and mortality. These papers were the result of a joint study undertaken by the Division of Public Health Methods and the National Office of Vital Statistics and partly financed by the National Heart Institute.

raises problems about the comparability of the population group studied, this study was restricted to the period from 1920 on. In 1920, 83.2 percent of the white population of the country and 66.1 percent of the nonwhite population were included in the death registration States. By 1930, these percentages had increased to 95.7 and 93.3, respectively. While the addition of States to the registration area between 1920 and 1933, when the area became complete, undoubtedly distorts the trends slightly, the amount of such disturbance is not considered to be greater than that caused by some of the other uncontrollable elements that have already been mentioned. The chief among these are the diagnostic, medical certification, and classification procedures.

If it were possible, we should like to remove by some sort of adjustment all artificially produced effects upon the mortality and then to isolate for study purposes the trends for each major population group and each different environment. If this could be done, the trends in the risk of dying from the cardiovascular-renal diseases in each group could be observed, and reasonable hypotheses to explain these trends could be formulated. These hypotheses could then be tested by experiment. In practice, however, it is only possible to approximate very roughly this ideal approach. In the first place, some of the artificially produced effects cannot be controlled, and, in the second place, data are not available to show trends for as many different subgroups of the population as might be desirable.

An example of an important demographic factor that probably is related to the risk of succumbing to cardiovascular-renal disease is the increase in the proportion of persons living in urban areas. From 1920 to 1947, this proportion rose from 51.2 percent to approximately 59.0 percent for the country as a whole. However, the proportion of persons in urban areas of the death registration States in 1920 was 57.2 percent. Hence, between 1920 and the present time the distribution of the population by urban or rural residence has not changed as much in the group of death registration States as it has in the country as a whole. This factor, therefore, could not be considered responsible for the changes in mortality that will be shown here.

In any case, time series of death rates that are specific for cause of death, age, race, sex, and urban or rural residence are not available in the official vital statistics of the United States, but rates specific for all characteristics except the last are shown in graphs to follow and in tables 1 and 2.[1]

The group of diseases included under the heading of heart disease in this report is the same as in other mortality papers of this series, namely, heart disease of infectious origin (other than that specified as syphilitic or acute rheumatic), functional heart disease without mention of organic lesion, chronic myocarditis,

[1] See the fourth report of this series (2) for an analysis of age-adjusted cardiovascular renal mortality among white persons in 1940, by sex and size of city.

**Table 1.** *Age-specific death rates per 100,000 population for the major cardiovascular-renal diseases at ages 25 years and over: United States Death Registration States, 1920–47*

[Rates in parentheses in first column are based on population including armed forces overseas; all other rates are based on population exclusive of armed forces overseas]

| Year | Age: 25–34 years | 35–44 years | 45–54 years | 55–64 years | 65–74 years | 75–84 years | 85 years and over |
|---|---|---|---|---|---|---|---|
| | White males | | | | | | |
| 1947 | 33.2 (32.7) | 138.1 | 502.7 | 1276.9 | 3055.4 | 6805.8 | 16016.1 |
| 1946 | 35.2 (34.3) | 136.8 | 485.2 | 1230.9 | 2919.7 | 6573.2 | 14903.6 |
| 1945 | 50.0 (35.5) | 149.4 | 503.9 | 1275.9 | 3013.0 | 6798.4 | 14454.8 |
| 1944 | 45.5 (35.7) | 146.8 | 491.5 | 1267.9 | 3031.5 | 6959.0 | 14089.4 |
| 1943 | 43.5 (39.3) | 146.6 | 498.7 | 1302.1 | 3156.8 | 7391.2 | 15096.4 |
| 1942 | 41.1 (39.8) | 144.5 | 489.2 | 1272.8 | 3022.0 | 6918.9 | 13634.2 |
| 1941 | 39.0 | 141.3 | 475.4 | 1259.8 | 3027.9 | 7132.4 | 13921.1 |
| 1940 | 41.8 | 139.7 | 471.7 | 1271.7 | 3099.2 | 7421.2 | 14509.9 |
| 1939 | 40.7 | 138.1 | 458.5 | 1219.8 | 2991.4 | 7362.4 | 14070.4 |
| 1938 | 41.5 | 136.8 | 444.1 | 1188.7 | 2945.2 | 7270.0 | 13390.7 |
| 1937 | 43.8 | 139.2 | 454.7 | 1229.6 | 2963.7 | 7545.9 | 13792.9 |
| 1936 | 43.2 | 140.7 | 451.4 | 1248.0 | 3037.4 | 7782.8 | 14565.6 |
| 1935 | 43.6 | 131.9 | 430.8 | 1193.5 | 2931.3 | 7287.9 | 13509.9 |
| 1934 | 43.9 | 134.8 | 436.6 | 1196.2 | 2956.0 | 7241.2 | 13374.2 |
| 1933 | 43.6 | 129.3 | 417.6 | 1181.7 | 2927.5 | 7013.1 | 12951.8 |
| 1932 | 44.5 | 131.6 | 412.6 | 1165.6 | 2948.9 | 7102.9 | 13558.3 |
| 1931 | 45.4 | 132.7 | 411.2 | 1149.1 | 2907.8 | 6849.4 | 12884.6 |
| 1930 | 47.9 | 133.0 | 408.6 | 1162.4 | 2999.2 | 7018.8 | 13030.7 |
| 1929 | 48.9 | 134.7 | 407.5 | 1140.4 | 3043.8 | 7211.6 | 13485.5 |
| 1928 | 49.8 | 137.9 | 406.3 | 1128.8 | 3084.5 | 7500.3 | 14134.3 |
| 1927 | 48.0 | 132.5 | 389.5 | 1080.1 | 2933.9 | 7099.2 | 13493.4 |
| 1926 | 49.7 | 131.3 | 398.7 | 1101.8 | 3039.0 | 7468.9 | 14367.9 |
| 1925 | 48.9 | 126.9 | 380.9 | 1076.3 | 2873.5 | 7090.8 | 13572.6 |
| 1924 | 48.6 | 126.9 | 378.0 | 1052.7 | 2847.5 | 6937.9 | 12889.2 |
| 1923 | 49.3 | 124.4 | 369.4 | 1073.1 | 2874.0 | 6944.3 | 13111.5 |
| 1922 | 46.4 | 119.1 | 354.6 | 1041.2 | 2848.4 | 6727.3 | 12477.6 |
| 1921 | 46.7 | 110.1 | 328.8 | 972.3 | 2647.5 | 6342.6 | 11867.1 |
| 1920 | 50.3 | 117.7 | 339.4 | 1007.5 | 2749.0 | 6575.3 | 11929.5 |
| | White females | | | | | | |
| 1947 | 23.4 | 69.2 | 228.3 | 648.1 | 2096.4 | 5771.2 | 15764.2 |
| 1946 | 25.2 | 78.4 | 232.1 | 659.2 | 2067.5 | 5701.3 | 14389.0 |
| 1945 | 28.5 | 78.9 | 246.9 | 693.3 | 2147.6 | 5881.8 | 13714.6 |
| 1944 | 29.4 | 82.8 | 254.1 | 715.5 | 2186.8 | 6071.0 | 13408.1 |
| 1943 | 33.7 | 90.2 | 269.8 | 761.8 | 2303.4 | 6400.1 | 13977.4 |
| 1942 | 33.3 | 88.2 | 262.3 | 734.7 | 2202.8 | 6015.9 | 12747.2 |
| 1941 | 32.7 | 87.8 | 261.4 | 743.0 | 2223.8 | 6171.1 | 12786.9 |
| 1940 | 34.7 | 92.4 | 271.8 | 770.4 | 2335.7 | 6466.5 | 13657.8 |
| 1939 | 36.7 | 94.5 | 277.7 | 789.0 | 2314.8 | 6577.3 | 13155.6 |
| 1938 | 36.5 | 96.5 | 280.9 | 779.4 | 2302.9 | 6438.1 | 12570.1 |
| 1937 | 39.8 | 100.9 | 287.5 | 807.4 | 2323.8 | 6583.6 | 12803.6 |
| 1936 | 41.4 | 104.9 | 298.2 | 833.9 | 2431.6 | 6827.0 | 13457.1 |
| 1935 | 42.2 | 102.0 | 296.7 | 816.8 | 2345.0 | 6355.8 | 12434.6 |
| 1934 | 42.6 | 104.3 | 299.7 | 835.7 | 2385.4 | 6427.9 | 12489.8 |
| 1933 | 43.8 | 104.4 | 297.2 | 839.0 | 2385.9 | 6256.4 | 12054.5 |
| 1932 | 46.2 | 109.3 | 305.7 | 856.5 | 2471.5 | 6434.2 | 12544.8 |
| 1931 | 47.3 | 111.9 | 308.8 | 864.1 | 2397.9 | 6104.3 | 11659.6 |
| 1930 | 49.7 | 115.9 | 319.5 | 885.5 | 2502.0 | 6298.8 | 12095.4 |
| 1929 | 51.8 | 119.5 | 326.8 | 892.5 | 2562.0 | 6507.2 | 12821.8 |
| 1928 | 53.7 | 127.1 | 337.3 | 900.2 | 2604.6 | 6709.5 | 13702.1 |
| 1927 | 53.2 | 123.0 | 330.7 | 865.5 | 2492.2 | 6352.8 | 12996.9 |
| 1926 | 51.6 | 128.2 | 342.0 | 924.4 | 2591.0 | 6729.3 | 14061.3 |
| 1925 | 53.4 | 126.7 | 336.5 | 888.9 | 2499.0 | 6383.5 | 13735.7 |
| 1924 | 52.5 | 126.4 | 342.9 | 880.0 | 2464.6 | 6325.8 | 12859.1 |
| 1923 | 54.0 | 131.1 | 343.7 | 905.4 | 2543.8 | 6403.7 | 13066.6 |
| 1922 | 54.5 | 129.1 | 337.9 | 889.9 | 2532.9 | 6207.5 | 12396.4 |
| 1921 | 55.3 | 124.5 | 337.1 | 878.6 | 2443.5 | 5923.7 | 11178.0 |
| 1920 | 65.9 | 136.1 | 353.3 | 927.8 | 2552.1 | 6135.5 | 11215.2 |

and coronary artery disease associated with hypertension and/or arteriosclerosis. Deaths attributed to these as a sole or primary cause are included, and the last two types, chronic myocarditis and coronary artery disease, account for more than three-quarters of the deaths assigned to the heart disease group as a whole. The title "major cardiovascular-renal diseases" used here includes the heart disease

**Table 2.** *Age-specific death rates per 100,000 population for the major cardiovascular-renal diseases at ages 25 years and over: United States Death Registration States, 1920–47*

[Rates in parentheses in first column are based on population including armed forces overseas; all other rates are based on population exclusive of armed forces overseas]

| Year | Age: 25–34 years | 35–44 years | 45–54 years | 55–64 years | 65–74 years | 75–84 years | 85 years and over |
|---|---|---|---|---|---|---|---|
| | **Nonwhite males** | | | | | | |
| 1947 | 75.1 (74.3) | 282.4 | 942.6 | 1852.6 | 3391.5 | 5006.5 | 7515.0 |
| 1946 | 73.7 (72.4) | 282.3 | 916.7 | 1776.1 | 3167.8 | 4551.1 | 7227.9 |
| 1945 | 102.5 (79.3) | 325.4 | 947.1 | 1810.7 | 3318.2 | 4873.9 | 7701.0 |
| 1944 | 100.1 (84.3) | 326.1 | 985.5 | 1811.3 | 3436.1 | 4864.3 | 8377.8 |
| 1943 | 101.6 (97.8) | 339.2 | 1023.0 | 1919.5 | 3577.6 | 5311.5 | 8655.6 |
| 1942 | 110.6 (109.2) | 362.7 | 1032.6 | 1848.2 | 3525.7 | 5045.1 | 8269.5 |
| 1941 | 112.6 | 360.1 | 1042.1 | 1874.1 | 3676.6 | 5448.4 | 8984.4 |
| 1940 | 119.3 | 361.0 | 1050.6 | 1916.9 | 3719.1 | 5821.1 | 9510.4 |
| 1939 | 120.3 | 367.2 | 1001.3 | 1950.3 | 3069.0 | 5903.6 | 8546.8 |
| 1938 | 122.3 | 401.4 | 1043.9 | 1904.8 | 3220.4 | 5662.1 | 8454.1 |
| 1937 | 131.4 | 407.6 | 1050.3 | 1962.3 | 3342.2 | 5985.3 | 9044.5 |
| 1936 | 133.9 | 431.5 | 1056.4 | 2016.9 | 3330.8 | 6235.1 | 9658.7 |
| 1935 | 131.0 | 405.9 | 986.6 | 1889.7 | 3022.9 | 5720.5 | 8996.0 |
| 1934 | 141.7 | 420.1 | 1034.0 | 1954.2 | 3292.4 | 6108.9 | 9571.3 |
| 1933 | 132.2 | 390.1 | 945.2 | 1881.9 | 3068.4 | 5543.9 | 9111.9 |
| 1932 | 134.3 | 411.6 | 969.2 | 1932.1 | 3160.7 | 5996.4 | 9465.5 |
| 1931 | 152.1 | 448.9 | 1016.6 | 1984.7 | 3387.2 | 6334.8 | 9973.0 |
| 1930 | 164.5 | 473.9 | 1150.3 | 2140.9 | 3804.3 | 6411.5 | 10461.1 |
| 1929 | 168.2 | 483.8 | 1103.6 | 1939.3 | 3701.8 | 6484.8 | 10548.2 |
| 1928 | 169.9 | 459.7 | 1114.1 | 1918.8 | 3564.3 | 6538.5 | 10613.0 |
| 1927 | 140.8 | 435.5 | 1021.7 | 1762.7 | 3428.5 | 6060.1 | 11477.2 |
| 1926 | 157.3 | 455.2 | 1130.2 | 1825.5 | 3593.4 | 6591.3 | 12508.5 |
| 1925 | 145.8 | 426.3 | 1044.2 | 1769.3 | 3603.0 | 6514.9 | 13693.2 |
| 1924 | 138.7 | 411.8 | 988.8 | 1693.9 | 3405.1 | 6543.9 | 13028.3 |
| 1923 | 134.1 | 354.1 | 847.4 | 1500.8 | 3118.3 | 6013.9 | 11499.1 |
| 1922 | 123.9 | 328.4 | 775.4 | 1384.3 | 2839.4 | 5475.3 | 10096.3 |
| 1921 | 124.2 | 315.6 | 678.4 | 1320.8 | 2784.6 | 5532.0 | 8976.1 |
| 1920 | 134.3 | 294.3 | 688.8 | 1408.2 | 3053.7 | 5589.2 | 9298.4 |
| | **Nonwhite females** | | | | | | |
| 1947 | 86.9 | 311.9 | 869.1 | 1742.3 | 3153.6 | 3999.0 | 5435.6 |
| 1946 | 93.8 | 316.2 | 845.6 | 1704.6 | 2927.4 | 3613.4 | 5403.6 |
| 1945 | 96.9 | 346.0 | 899.4 | 1753.0 | 2982.4 | 3833.3 | 5830.1 |
| 1944 | 105.1 | 367.7 | 918.7 | 1806.5 | 3063.2 | 4019.4 | 6389.6 |
| 1943 | 113.0 | 393.2 | 984.2 | 1921.6 | 3191.8 | 4268.8 | 6692.9 |
| 1942 | 110.3 | 375.6 | 982.5 | 1827.1 | 3136.2 | 3856.0 | 6219.0 |
| 1941 | 116.6 | 392.0 | 1033.8 | 1876.1 | 3150.3 | 4238.3 | 7025.8 |
| 1940 | 122.5 | 398.8 | 1037.3 | 1901.7 | 3271.3 | 4731.9 | 6951.2 |
| 1939 | 121.0 | 389.7 | 1009.3 | 2013.5 | 2764.5 | 4646.2 | 6753.5 |
| 1938 | 131.5 | 402.6 | 1032.7 | 2005.6 | 2795.9 | 4665.0 | 6835.8 |
| 1937 | 134.2 | 410.1 | 1026.3 | 2044.9 | 2901.3 | 4670.0 | 6985.8 |
| 1936 | 145.7 | 436.1 | 1032.4 | 2108.0 | 3048.3 | 5135.0 | 7551.4 |
| 1935 | 142.2 | 410.9 | 1003.1 | 1998.9 | 2794.3 | 4432.5 | 7190.2 |
| 1934 | 150.1 | 439.5 | 1057.8 | 2073.8 | 3108.0 | 4871.3 | 7272.0 |
| 1933 | 147.9 | 397.3 | 1042.1 | 2061.0 | 2983.2 | 4740.6 | 6726.5 |
| 1932 | 161.7 | 429.7 | 1060.6 | 2077.8 | 3059.1 | 4577.2 | 7173.3 |
| 1931 | 174.4 | 449.8 | 1111.8 | 2133.4 | 3270.8 | 4639.7 | 7093.4 |
| 1930 | 187.5 | 495.6 | 1194.3 | 2258.9 | 3445.3 | 4864.6 | 7880.4 |
| 1929 | 182.7 | 506.1 | 1158.9 | 2139.3 | 3301.9 | 5199.0 | 7867.9 |
| 1928 | 182.8 | 522.4 | 1177.7 | 2098.0 | 3474.1 | 5103.0 | 8347.2 |
| 1927 | 177.4 | 502.1 | 1143.0 | 1958.9 | 3323.4 | 5056.6 | 7815.3 |
| 1926 | 178.8 | 512.9 | 1207.6 | 1979.1 | 3523.0 | 5407.3 | 8779.6 |
| 1925 | 172.8 | 497.6 | 1141.0 | 1945.3 | 3499.5 | 5345.5 | 9438.5 |
| 1924 | 167.3 | 477.6 | 1172.4 | 1932.5 | 3426.1 | 5092.0 | 8556.2 |
| 1923 | 153.7 | 428.7 | 1059.7 | 1866.5 | 3138.9 | 4840.6 | 8572.2 |
| 1922 | 146.1 | 397.7 | 965.0 | 1792.4 | 2991.8 | 4714.7 | 7829.2 |
| 1921 | 167.9 | 391.8 | 921.4 | 1767.7 | 2949.0 | 4902.2 | 7677.2 |
| 1920 | 162.3 | 392.2 | 913.0 | 1684.6 | 3032.0 | 5014.1 | 7534.4 |

deaths (which had the codes 90–95 in the 1938 revision of the International List of Causes of Death) and also deaths attributed as a sole or primary cause to intracranial lesions of vascular origin (International List No. 83 in the 1938 revision) or to any form of nephritis (International List Nos. 130–132 in the 1938 revision).

In the trends shown graphically in the second report of the series (*1*), deaths

credited as primarily due to arteriosclerosis (International List No. 97) and idiopathic high blood pressure (International List No. 102) were included from the year 1930 on. These are shown separately in the appendix tables of that report. In this report these causes are excluded throughout. Mortality from the two causes combined has remained relatively stable ever since they were given separate titles in the International List. The crude death rate from these two causes in this period varied from 17 to 22 per 100,000 population.[2]

Examination of the race-sex subgroups does not offer any grounds for rejecting the hypothesis that there has been a shift in the assignment of cause of death away from the intracranial vascular lesions and nephritis and toward heart disease. Consequently, all graphs that are to follow will show trends for the group which we have called the "major cardiovascular-renal diseases."

## Variation With Age for Each Race-Sex Group

The pattern of variation with age in the trend of the total age-specific death rates for the cardiovascular-renal diseases was described in the second report of this series (*1*). Figures 1 and 2 show the corresponding pattern for each of the four race-sex groups.[3] The mortality has been plotted on a logarithmic scale because the emphasis is on relative rather than absolute changes.

The graph for white females seems to present a fairly consistent relationship between age and slope of the trend: going from the youngest age group shown (25–34 years) to the oldest, there is a gradual change from a marked downward slope to an appreciable upward slope at 85 years and over. (The addition of "senility" deaths would eliminate this last because there has been a steady decrease in the use of this term on death certificates. In all probability many such deaths are now assigned to one or the other form of cardiovascular-renal disease.)

The other three graphs do not show this same relationship between age and slope. Among white males there is an unmistakable upward trend at all ages between 35 and 65 years. This is particularly distinct at 45–54 years of age. At 65–74 years and 75–84 years there is no trend, and at 85 years and over there is an upward tendency which is almost identical with that for white females.

In the earlier years of the period under study, there is some rise in nonwhite male and female mortality at all ages. This may be due to the fact that the characteristics of the nonwhite population included in the death registration area changed quite rapidly in the

[2] Beginning with the statistics for 1949, deaths in the Federal vital statistics reports will be classified by cause according to the new International Statistical Classification of Diseases, Injuries, and Causes of Death, adopted in 1948. Beginning at the same time, the National Office of Vital Statistics will use the terms "cardiovascular diseases" and "cardiovascular-renal diseases" in a somewhat more inclusive manner than has been used in this series of reports. Hence, death rates from tables published in these papers should not be compared with those from official Federal reports for the year 1949 and thereafter without a full understanding of the differences in the detailed terms included under these two general headings.

[3] Note that these time series have been carried 2 years farther than those in reference (*1*).

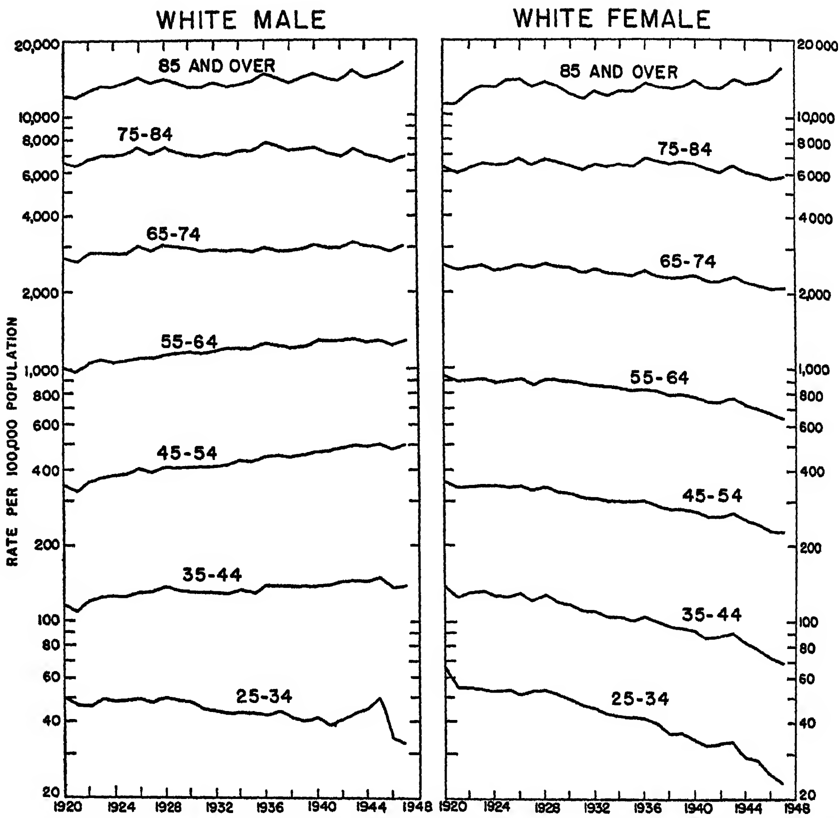


**Figure 1. Age-specific death rates for the major cardiovascular-renal diseases among white males and females: United States Death Registration States, 1920–47.**

period 1920–1933 owing to the admission of several large Southern States. However, since 1933 there has been no clear-cut upward trend at any age among the nonwhite males and females.[4]

Two series of death rates for males are shown in these graphs for the war years 1942–1947, for the age group 25–34 years. The lower of the two is based on estimates of the population that include men in the armed services overseas, while the upper is the rate published in the official vital statistics reports which is based on the population exclusive of the men overseas. All deaths that occurred overseas are excluded in both rates. However, relatively few deaths from chronic disease took place among the men while out of the country. In 1945, for example, the number of deaths among members of the

[4] There is a curious tendency for the nonwhite mortality to decline more in the two age groups over 75 years than in the next younger age group. This may possibly be a result of misstatement of age or lack of knowledge of age which is known to be especially common among the older Negroes. A complete explanation based on this supposition would require not only information on accuracy of age statement on both the death certificate and the census record but also an examination of changes in the amount and direction of the errors over the last 25 or 30 years.

armed forces overseas from the causes with which we are concerned was not over 550 at all ages. In the age group 25–34 years, the exclusion probably amounted to less than 3 percent of all male cardiovascular-renal deaths. Consequently, the rate based on the male population including those overseas is more comparable with the rates for peacetime years.

## Race-Sex Groups Compared at Each Age

To facilitate the comparison of trends between males and females and between white and nonwhite persons, the rates for the four major subgroups have been brought together in figure 3 in separate graphs for each age group beginning at 25 years of age. Again, the vertical scale is logarithmic.

One of the most striking features of these graphs is not a matter of trend at all. It is the change with age in the ratio of the white to the nonwhite death rate. It is clear that the marked excess in nonwhite mortality in the youngest age group is diminished with increasing

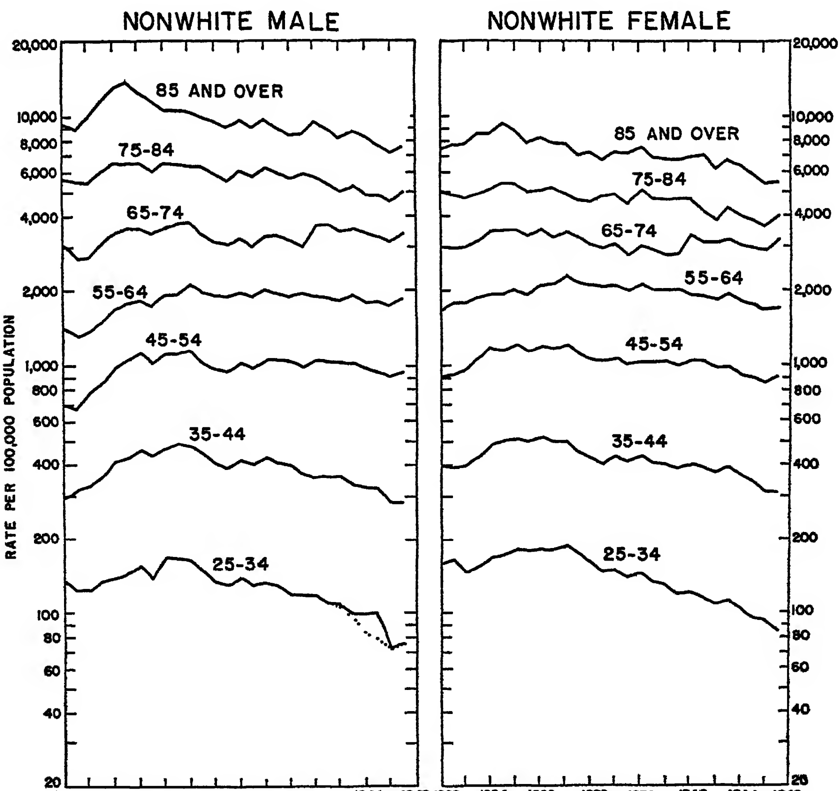


**Figure 2. Age-specific death rates for the major cardiovascular-renal diseases among nonwhite males and females: United States Death Registration States, 1920–47.**



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age until at 65–74 years of age the white-male time series is hardly distinguishable from the two nonwhite series. At 75 years and above, the white mortality for both sexes is clearly higher. This reversal is evident in the United States life tables for the white and Negro [5] populations in 1939–1941 (*3*). The average future lifetime for persons arriving at their 35th and 75th birthdays is shown below:

*Average Future Lifetime in Years: United States, 1939–1941*

| | | *White* | *Negro* |
|---|---|---|---|
| Age 35 | Males | 34.36 | 28.48 |
| | Females | 37.70 | 30.71 |
| Age 75 | Males | 7.17 | 8.17 |
| | Females | 7.92 | 9.81 |

Since this reversal appears in mortality from all causes combined, it is obviously not to be explained as solely a matter of poorer diagnosis on death certificates for nonwhite persons. However, it is possible that under-registration of deaths or inaccuracy of age information for the older Negroes on the death certificate, or the census record, or both, could account for the peculiarity. Although there is no definitive evidence on this point, it is believed that the death rates for all causes among the Negroes over 65 years of age may be actually no lower than those for whites. Hence, the fact that cardiovascular-renal rates are lower for the nonwhite population at advanced ages should not be considered of great significance.

A point of undoubted significance, on the other hand, is that the trend of cardiovascular-renal mortality among white males does not follow the pattern of the other three race-sex groups. If we pay chief attention to the last 20 years of the time series, that is, the years 1928 to 1947, the slopes of the three curves for white females and nonwhite males and females are not much different from one another in the "working ages," 25–64 years. On the whole, these three seem to show a gradual decline, with the white female series dropping slightly more rapidly than the other two. But the death rate among white males has a downward slope that is definitely less steep than the other three at 25–34 years, no downward slope at all at 35–44 years at an age when the other three are clearly falling, and an upward trend at 45–64 years when the other three are still declining, though less rapidly than at the earlier ages.

The contrast between the direction of the curves for the white males and females between 35 and 65 years is very marked. In 1920, the difference between the two sexes was negligible while in 1947 the white male rate exceeded that for white females by 100 percent at 35–44 years of age, 120 percent at 45–54 years of age, and 97 percent at 55–64 years of age.

[5] The life tables were shown separately for Negroes and other races, but Negroes constitute about 95 percent of all nonwhite persons in the United States.

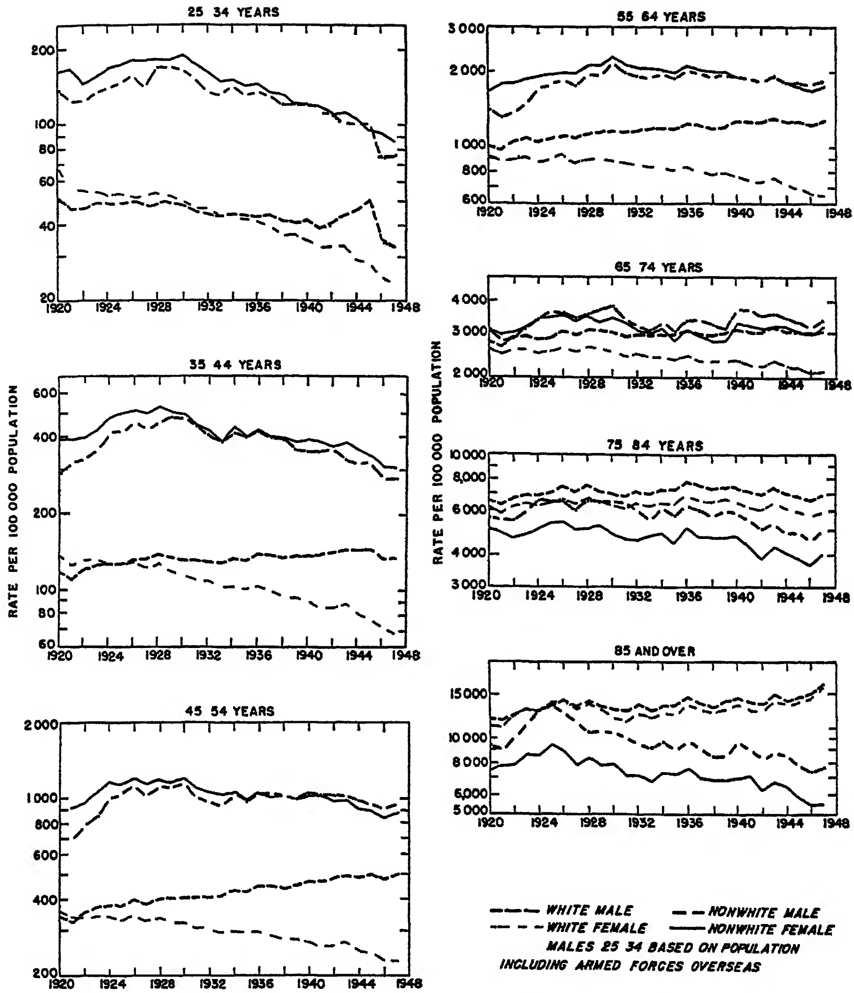


**Figure 3. Age-specific death rates for the major cardiovascular-renal diseases in four population groups: United States Death Registration States, 1920–47.**

By comparison, the sex differences in the trends of nonwhite cardiovascular-renal mortality in these same ages are trivial. Although there was some excess in the mortality among nonwhite females as compared with nonwhite males in the earlier years of the period under study, by 1940 this had completely disappeared in the age group 45–64 years. At ages 25–44 years it disappeared and then reappeared so that in 1947 the rate for females was slightly higher than for males.

Up to age 75, the death rate for white females is the only one that has shown some improvement in every age group. Above that age, the sex differences seem to become distinctly less important in

the white mortality and slightly more important in the nonwhite. Both the nonwhite rates show a tendency toward a decline at ages over 75. If this tendency continues, there will be in the future an even greater excess of white over nonwhite mortality in the oldest age groups. Owing to the dubious accuracy of the records for persons at these ages, the importance of this excess is difficult to determine.

Table 3 shows the net change that has taken place in the mortality from this group of causes from one age-race-sex group to another. In this table, the average mortality in the 3-year period, 1945–47, is compared by means of ratios to the average mortality in the 3-year period, 1927–29, taken as a base period.[6] Here the contrast between the increase that has occurred among white males between 35 and 65 years of age and the decrease at the same ages among all females and nonwhite males is particularly clear.

Table 3. *Ratio of death rate for major cardiovascular-renal diseases in the period 1945–47 to the corresponding rate in the period 1927–29*

| Age (years) | White males | White females | Nonwhite males | Nonwhite females |
|---|---|---|---|---|
| 25–34 | [1] 0.699 | 0.486 | [1] 0.472 | 0.511 |
| 35–44 | 1.047 | .599 | .645 | .636 |
| 45–54 | 1.240 | .711 | .866 | .751 |
| 55–64 | 1.130 | .753 | .968 | .839 |
| 65–74 | .992 | .835 | .924 | .897 |
| 75–84 | .925 | .887 | .756 | .745 |
| 85 and over | 1.104 | 1.110 | .688 | .694 |

[1] Death rates for 1945–47 based on population including armed forces overseas.

## Comparison With Mortality for "All Other Causes"

It is natural to ask at this point whether the variation in the trend among the four race-sex groups at any one age is characteristic of other causes of death as well as those we have called the major cardio-vascular-renal diseases. In particular, it would be of interest to know whether the slope of the trend of death rates for other causes shows the same peculiarity among white males as has just been observed for chronic diseases of the heart, arteries, and kidneys.

In general, the data of figure 4 and table 4 show that this departure of the white male trend from that for the other three groups does not occur in mortality from all other causes combined. The mortality from all other causes among white females is declining more rapidly than it is among white males, but in none of the four groups is there an increase as there is in the white male mortality from the cardiovascu-lar-renal diseases. In the white population, the contrast between the sexes is very much greater for the circulatory and kidney diseases than it is for the other causes of death. Figure 4 shows only three of

[6] The reason for selecting this base period rather than an earlier one is the shift in the trend of nonwhite mortality that occurred at about this time.

the seven age groups being considered; however, table 3 shows the amount and direction of net change that has taken place in each age, race, and sex group relative to the base period selected, 1927-29. These figures may be compared with those in table 3.

Table 4. *Ratio of death rate for all other causes in the period 1945-47 to the corresponding rate in the period 1927-29*

| Age (years) | White males | White females | Nonwhite males | Nonwhite females |
|---|---|---|---|---|
| 25-34 | 0.501 | 0.375 | 0.475 | 0.414 |
| 35-44 | .555 | .498 | .604 | .504 |
| 45-54 | .670 | .617 | .762 | .585 |
| 55-64 | .781 | .664 | .845 | .647 |
| 65-74 | .791 | .688 | .776 | .640 |
| 75-84 | .758 | .673 | .528 | .449 |
| 85 and over | .806 | .742 | .398 | .334 |

## Sex Differences in the White Mortality Trend

Examination of the 1930-1947 data for the three main groups of diseases making up the major cardiovascular-renal diseases shows that the difference in mortality trends between white males and white females is greatest for all forms of heart diseases and somewhat less marked but significantly different for nephritis. The sex differential in trend in the death rates for intracranial lesions of vascular origin is not sufficient to be of any consequence.

The death rates for heart disease (all forms) have increased greatly among white males in the ages 35 to 64, while the corresponding rates for white females have been declining. The pattern of sex differences in mortality trends by age differs somewhat with the various specific forms of heart disease. For example, the death rate for diseases of coronary arteries and angina pectoris has increased among females as well as among males in every age group. However, in every case, except for the oldest age group, 85 years and over, the rate of increase in the death rate for white males has been much greater than for white females. The differences observed in the male and female trends for coronary diseases and angina pectoris are of particular significance because of the large frequency of deaths from these causes, and because mortality from coronary diseases and angina pectoris is much higher among males than among females.

The nephritis death rate for white males is not decreasing as fast as it is for white females. This is particularly true in the age groups 25-64 years, considered in this study. One reason that might be suggested to account for these differences in the rate of decline is the change in comparability of chronic nephritis statistics due to the 1938 revision of the International List of Causes of Death. In this revision, terms such as cardiorenal diseases and cardiovascular-renal diseases were transferred from a heart disease rubric to a nephritis

category. This change in classification certainly altered the trend of nephritis and heart mortality. However, it should not affect the comparison of the trend of the death rates for the two sexes, unless the proportion of conditions reported as cardiorenal or cardiovascular-renal among males differs substantially from that among females. Data on this point are not available, but it does not seem likely that the change in statistical procedure because of the International List revision would account for the observed sex differences in the rate of decline in the death rate for nephritis or for the divergence in the trends of male and female mortality from heart disease.

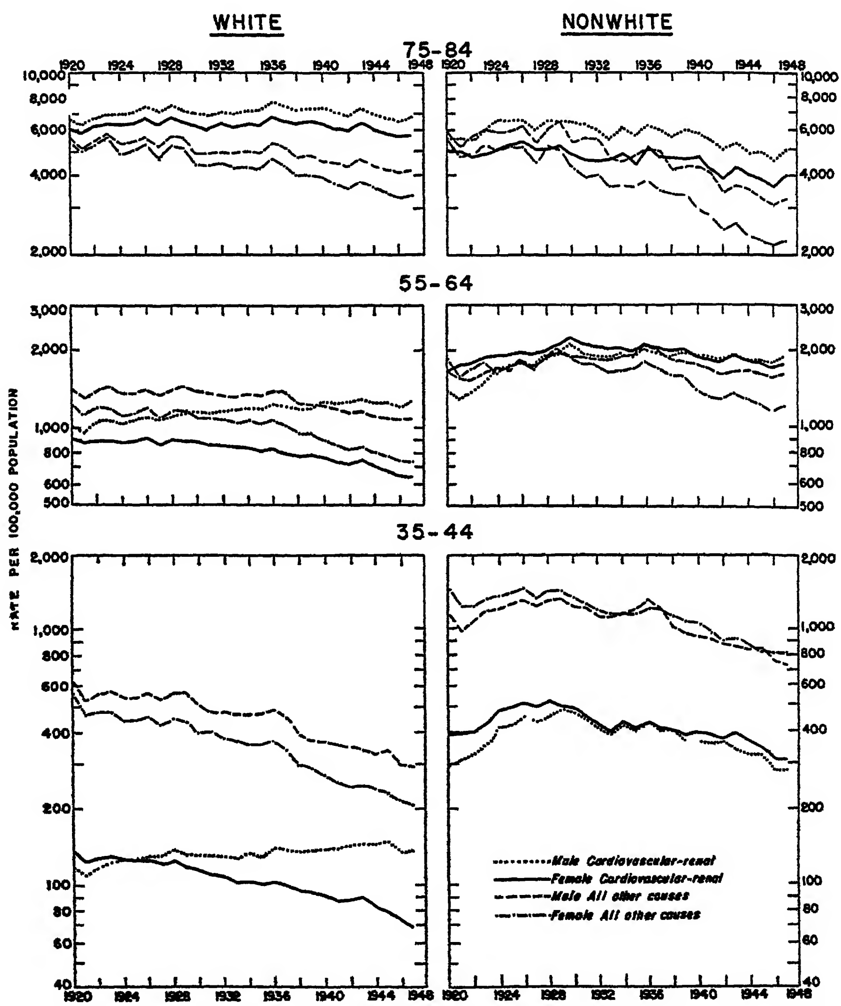


**Figure 4.** Comparison of death rates for the major cardiovascular-renal diseases with death rates for all other causes combined: United States Death Registration States, 1920–47.

Data for England and Wales show very much the same picture, namely, that the death rate for the major cardiovascular-renal diseases is declining faster among females than among males. However, in England and Wales the death rate for males is also declining in the age groups 35 to 44 years, whereas in the United States white male mortality is increasing in every age group from 35 through 64 years.

Of the various problems raised in the analysis of mortality for these Statistical Studies of Heart Disease, that of the increasing risk of death from the major cardiovascular-renal diseases among white males between the ages 35 and 64 years is the most challenging. Because the analysis has been based upon age-specific death rates, the changes cannot be explained as an effect of the aging population, and, in fact, there does not seem to be any good explanation which accounts for an upward trend in the death rate for these diseases among white males while the corresponding rates for white females are going down. The increases in male mortality rates appear to be occurring in the most productive working ages. If they represent true trends, they have serious health, economic, and social implications. For this reason, the problem is one that must definitely be investigated further.

## Summary

Death rates specific for age, race, and sex for the major cardiovascular-renal diseases as a group are examined in a study of trend of mortality from these causes in the United States from 1920 to 1947. The outstanding fact to which attention is directed is the increase in cardiovascular-renal mortality among white males in the ages 35–64 years, in contrast to the marked reductions in the same age groups occurring among white females and, to a lesser extent, among nonwhite males and females. It is shown that the death rate among white males in the working ages is not increasing for all other causes of death combined. The contrast between the trend for white males and females is most marked for diseases of the heart, slightly less so for chronic nephritis, and inconsequential for intracranial lesions of vascular origin.

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# Graduates From Undergraduate Sanitary Engineering Courses in the United States

By Arthur P. Miller*

Since 1924, the Public Health Service has presented four studies pertaining to undergraduate sanitary and public health engineering education in the United States. The first three (*1*, *2*, *3*) discussed both the curricula and the number of persons successfully completing prescribed work. The last one (*4*) was concerned only with an analysis of the curricula in 29 institutions.

This study brings together the available data on the number of persons who have completed work in sanitary and public health engineering from 1889 through 1950, but does not include a discussion of curricula.

As the names of institutions giving work of this description were not assembled in any one document, it was necessary to compile a list of them from college and university catalogues and from publications of the Office of Education, the Engineers' Council for Professional Development, and the American Public Health Association. Full use was made, also, of the information contained in prior Public Health Service publications on this subject.

To assure that no sources of information were overlooked, those universities and colleges shown in the September 30, 1949, report of the Engineers' Council for Professional Development as having accredited civil engineering courses were circularized. As sanitary engineering courses are usually within the jurisdiction of civil engineering schools, this action was thought to be sufficient to obtain information on any sanitary engineering curriculum not previously known.

To a certain degree, inclusion or exclusion of an institution within the scope of this survey was arbitrary. A review of catalogues showed that some colleges offered definitely prescribed sanitary engineering options; others indicated the availability of a sequence of courses in sanitary engineering without specifying that they comprised an optional course; still others set forth enough courses to enable the student to obtain an adequate education in sanitary engineering if the proper ones were elected. In the end, much dependence was placed upon the opinions of the correspondents at the various institutions as to whether their data on sanitary engineering graduates should be used in this summary. This is not a definitive method of selection,

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Table 1. *Number of graduates from undergraduate courses in sanitary engineering in the United States—1889–1950*

| College | 1889 | 1890–99 | 1900–1909 | 1910–19 | 1920–24 | 1925–29 | 1930–34 | 1935 | 1936 | 1937 | 1938 | 1939 | 1940 | 1941 | 1942 | 1943 | 1944 | 1945 | 1946 | 1947 | 1948 | 1949 | 1950 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Alabama Polytechnic Institute | | | | | | 16 | 29 | 3 | 7 | 6 | 10 | 3 | 8 | 3 | 0 | 7 | 3 | 1 | 3 | 4 | 7 | 9 | 10 |
| Alabama, University of | | | | | | | | | | | | | | | | [1]3 | 3 | 0 | 0 | 3 | 1 | 0 | 3 |
| California, University of | | | 49 | 20 | 9 | 14 | 31 | 19 | 12 | 8 | 13 | 9 | 15 | 8 | 12 | 9 | 4 | 3 | 4 | 8 | 20 | 16 | 12 |
| Carnegie Institute of Technology | | | | [2]7 | 1 | | | | | | | | | | | | | | | | | | |
| Case Institute of Technology | | | | | | | | 5 | 3 | 3 | 2 | 5 | 3 | 5 | 5 | 4 | 9 | 6 | 0 | 2 | 1 | 4 | 4 |
| Columbia University | 2 | 0 | [3]0 | (4) | 0 | [5]1 | | | | | | | | | | | | | | | | | |
| Cornell University | | | 1 | 49 | 8 | 4 | 12 | 3 | 1 | 0 | 1 | 3 | 1 | 1 | 0 | 4 | [6]1 | 0 | 2 | 1 | 1 | 0 | 2 |
| Florida, University of [7] | | | | | | | | | | | | | | (1) | 0 | 0 | 0 | 0 | 0 | 2 | 2 | 2 | 2 |
| Do.[8] | | | | | | | | | | | | | | | | | | | (1) | 0 | 2 | 2 | 8 |
| Georgia Institute of Technology | | | | | | | | | | | | | | | | | | | [1]1 | 6 | 3 | 4 | 8 |
| Harvard University | | | | 15 | [9]8 | 1 | | | | | | | | | | | | | | | | | |
| Illinois, University of | | 4 | 23 | 54 | 13 | 24 | 8 | 1 | 3 | 1 | 4 | 7 | 11 | 8 | 5 | 0 | 8 | 20 | 2 | 4 | 7 | 6 | 2 |
| Iowa, State University of | | | | | 10 | 48 | 24 | 5 | 3 | 10 | 5 | 6 | 8 | 5 | 6 | 8 | 0 | 0 | 0 | 4 | 2 | 6 | 17 |
| Kansas, University of | | | | 4 | 8 | 5 | 8 | 1 | 2 | 2 | 0 | 6 | 4 | 2 | 2 | 2 | 0 | 0 | 0 | 4 | 6 | 12 | 6 |
| Kentucky, University of | | | | | | | | | | | | | | 2 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 2 | 1 |
| Lafayette College | | | | | | | | | | | | | | | | | | | | | | (1) | 0 |
| Lehigh University | | | | | | | | | 1 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | (8) |
| Louisiana State University | | | | | | | | | | | | (1) | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 2 | 0 |
| Maine, University of | | | | | | 5 | 29 | 5 | 6 | 2 | 1 | 4 | 1 | 2 | 4 | 4 | 3 | 0 | 0 | 6 | 4 | 3 | 5 |
| Manhattan College | | | | | | | | | | | | 15 | 9 | 6 | 9 | 13 | 14 | 3 | 11 | 21 | 18 | 23 | 25 |
| Massachusetts Institute of Technology [7] | | | | | | | 2 | 2 | 4 | 2 | 0 | 0 | 0 | 0 | 2 | (6) | | | | | | | |
| Do.[8] | | 25 | 48 | 129 | 19 | 15 | 18 | 1 | 2 | 1 | 1 | 1 | 0 | 0 | 1 | [6]1 | 2 | | | | | | |
| Do.[10] | | | | | | | | | | 8 | 10 | 7 | 1 | 2 | 4 | 3 | 0 | 1 | 0 | 3 | 4 | 2 | 3 |
| Michigan College of Mining and Technology | | | | | | | | | | | | | | | | | | (11) | 0 | 11 | 10 | 10 | 27 |
| Michigan State College | | | | | | | 13 | 5 | 4 | 1 | 2 | 3 | 3 | 6 | 5 | [6]0 | | | (12) | 0 | 0 | 3 | 7 |
| Michigan, University of | | | | 84 | 44 | 40 | 22 | 4 | 3 | 2 | 3 | 2 | 3 | 5 | 0 | 1 | 1 | 2 | 0 | 6 | 3 | 8 | 10 |
| Minnesota, University of | | | | | | | | | | | | | | | | (1) | 0 | 0 | 0 | 0 | 1 | 2 | 1 |
| Mississippi State College | | | | | | | | | | | (1) | | | | | 88 | | | | | | | 28 |
| Missouri School of Mines and Metallurgy | | | | | | | 8 | 2 | 2 | 3 | 1 | 2 | 1 | 2 | 3 | 2 | 0 | 0 | 0 | 1 | 4 | 8 | 15 |
| Missouri, University of | | | | | | | | | (1) | 0 | 0 | 0 | 1 | 2 | 1 | 1 | 0 | 0 | 0 | 2 | 4 | 3 | 4 |
| New York University | | | | | | | 4 | 0 | 4 | 8 | 6 | 7 | 7 | 15 | 10 | 7 | 6 | 0 | 0 | 2 | 4 | 4 | 8 |
| Newark College of Engineering | | | | | | | | | | | | | | | | | | (1) | 0 | 0 | 0 | 5 | 6 |
| North Carolina State College of Agriculture and Engineering | | | | | | | 15 | 5 | 1 | 1 | 1 | 1 | 1 | 3 | 1 | 1 | 1 | 0 | (6) | | | | |
| Oklahoma Agricultural and Mechanical College | | | | | | 11 | 16 | 5 | 2 | 0 | [6]1 | | | | | | | | | | [11]1 | 2 | 2 |
| Oklahoma, University of | | | | | | | | | | | | | | | | | | | | (1) | 0 | 1 | 2 |
| Oregon State College | | | | | | | | | | | | | | | | | | (1) | 0 | 7 | 15 | 34 | 17 |
| Pennsylvania State College | | | 6 | 56 | 17 | 14 | 28 | 4 | 0 | 2 | 1 | 6 | 7 | 2 | 4 | 0 | 0 | 0 | 0 | 2 | 7 | 1 | 7 |
| Pittsburgh, University of | | | | 11 | [9]1 | | | | | | | | | | | | | | | | | | |
| Purdue University | | | | | | | 32 | 4 | 8 | 5 | 3 | 6 | 13 | 3 | 10 | 2 | 0 | 1 | 1 | 1 | 7 | 7 | 8 |
| Rensselaer Polytechnic Institute | | | | | | | | | | | | | | (1) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| Rutgers University | | | | | | 3 | 8 | 1 | 3 | 1 | 2 | 1 | 0 | 1 | 2 | 1 | 0 | 0 | 2 | 0 | 3 | 0 | 0 |
| Santa Clara University | | | | | | | | | | | | (1) | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 13 | 0 |
| South Carolina, University of | | | | | | | | | | (1) | 0 | 0 | 2 | 0 | [6]0 | | | | | | | | |
| Texas, Agricultural and Mechanical College of | | | | | | | | | | | | | 1 | 2 | 1 | 0 | 3 | 1 | 1 | 5 | 7 | 11 | 4 |
| Texas, University of | | | 1 | 0 | 1 | 1 | 7 | 0 | 3 | 1 | 1 | (6) | | | | | | | (12) | 0 | 3 | 5 | 1 |
| Tulane University of Louisiana | | | | | | | | | | | | | | | | | | | | | (1) | 0 | 0 |
| Utah State Agricultural College | | | | | | | | | | | | | | | | | | | | | (1) | 2 | 5 |
| Virginia Polytechnic Institute | | | | | | | 2 | 2 | 5 | 3 | 9 | 4 | 11 | 6 | 1 | 2 | 0 | 1 | 0 | 4 | 4 | 7 | 15 |
| West Virginia University | | | | 1 | 1 | 6 | 16 | 7 | 5 | 1 | 2 | 4 | 0 | 0 | 1 | 0 | 3 | 0 | 0 | 0 | 1 | 2 | 5 |
| Wisconsin, University of | | | | | | | 1 | 2 | 4 | 4 | 3 | 0 | 5 | 5 | 1 | 1 | 3 | 1 | 1 | 2 | 3 | 15 | 7 |

[1] Option or course first offered.
[2] Course discontinued in 1919.
[3] Course discontinued in 1900.
[4] Course resumed in 1918.
[5] Course discontinued in 1928.
[6] Option or course discontinued.
[7] Public health engineering option.
[8] Sanitary engineering option.
[9] Course discontinued in 1922.
[10] These students completed work equivalent to the requirements of the sanitary engineering option.
[11] Elective sequence started.
[12] Option resumed.



March 23, 1951

but in the absence of any applicable standards recourse was made to it.

Data on the number of graduates from sanitary engineering curricula for the years 1889–1938 have been published previously (*3*). The principal purpose of this study was therefore to extend these data through 1950. During work on another study, it was found as a result of reviewing old college and university records that some of the figures for the years 1889–1938 were wrong. Corrections, therefore, have been made in the statistical summary presented in table 1. The information for the years prior to 1935 has been grouped in 10- and 5-year periods after corrections were made.

The number of sanitary engineers graduating from available undergraduate courses has fluctuated each year since 1938. In 1938 (the last year in the author's summary published in 1939) 82 completed the required work. There was then an increase until 1941 which was followed by a decrease until 1947. That year the trend again started upward, and in 1950 there were 287 graduates.[1]

If the number of graduates for each 5-year period ending with a census year is compared to the population calculated for the mid-year in the respective 5-year period, an increase in the "production" rate is demonstrated.

There are today more colleges and universities giving work in sanitary engineering than there were 12 years ago (1938) and also, on the average, more men are completing their work in this area than in 1938. The 21 institutions having available courses in sanitary engineering for the full 5-year period 1934–38 graduated during that period 414 men, or 3.9 per institution per year. (The minimum per institution was zero and the maximum 19.) For the 1946–50 period, the number graduated from 33 institutions was 821, or 5.0 per institution per year. (In this period the minimum per institution was also zero and the maximum 34.)

Table 2. *Number of graduates per million population per year*

| Census year | Number of graduates in 5-year period ending with each census year | Year for which population calculated | Millions of population | Number of graduates per million population per year |
|---|---|---|---|---|
| 1900 | 35 | 1898 | 73 | 0.10 |
| 1910 | 152 | 1908 | 88 | .35 |
| 1920 | 423 | 1918 | 102 | .83 |
| 1930 | 369 | 1928 | 119 | .62 |
| 1940 | 850 | 1938 | 129 | 1.32 |
| 1950 | 1,271 | 1948 | 146 | 1.74 |

Requirements for completion of sanitary engineering training vary

[1] As the number of graduates yearly for the period 1939–1949 from Mississippi State College was not available, the total number, 88, has been prorated over the 11 years for statistical purposes.

greatly. In one university, the student is expected to successfully complete the following courses:

*Institution A (two-semester year)*

| | *Semester hours* |
|---|---|
| Sewage analysis | 2 |
| Sewage treatment | 2 |
| General biology | 4 |
| Public water supplies | 4 |
| Water analysis | 2 |
| Limnology | 3 |
| General bacteriology | 4 |
| Sewerage and sewage treatment | 4 |
| Water purification | 2 |
| Stream pollution | 2 |
| Municipal plant management | 2 |
| Industrial waste and municipal refuse treatment | 2 |
| Semester hours | 33 |

On the other hand, at another institution the requirements include only the following courses:

*Institution B (three-term year)*

| | *Term hours* |
|---|---|
| Sewerage design | 3 |
| Water supply engineering | 3 |
| Sanitary bacteriology | 4 |
| Sewage treatment | 3 |
| Municipal and rural sanitation | 4 |
| Term hours | 17 |
| Equivalent hours on a two-semester basis | 11.3 |

Such difference of opinion as to what is necessary for the training of a sanitary engineer makes it difficult to accomplish a statistical summary of this kind. There is lacking for this purpose a screen of curriculum adequacy. The absence of such a tool involves the investigator in decisions which may be subject to criticism. It would therefore be very useful to have a generally acceptable minimum of course content to apply to each student's academic accomplishment to determine the suitability of including him in future similar tabulations. This would make the data more meaningful.

The corrections in the data for the years prior to 1939 were made possible by reviews of college and university records by Assistant Sanitary Engineer (R) Walter A. Lyon during visits to the institutions involved. Professors at the various institutions assisted in preparing this tabulation by collecting and supplying many of the data used. To all who assisted, the author expresses his appreciation.

## REFERENCES


(*1*) Mendelsohn, Isador W.: Sanitary engineering courses of engineering colleges in the United States. Pub. Health Rep. **39**: 1989 (1924).

(*2*) Mendelsohn, Isador W.: Sanitary engineering courses of engineering colleges in the United States. Pub. Health Rep. **44**: 645 (1929).

(*3*) Miller, Arthur P.: Undergraduate engineering training in public health and related activities in engineering colleges of the United States. Pub. Health Rep. **54**: 29 (1939).

(*4*) Straub, Conrad P.: Undergraduate sanitary engineering training in the United States. Pub. Health Rep. **64**: 1315 (1949).

# Hazards of Shoe-Fitting Fluoroscopes

By WILLARD W. VAN ALLEN, B.Sc.*

Radiation hazards associated with the use of X-ray shoe-fitting machines have recently become a matter of great concern to both roentgenologists and departments of public health. This concern has been expressed in professional journals and in popular articles appearing in nontechnical publications as well as by the adoption of regulatory codes in several States and cities. As used in the ordinary shoe store, shoe-fitting fluoroscopic equipment is operated by persons who have no knowledge of roentgen characteristics and no training in X-ray technique. Moreover, there is no way of imposing any control over the shoe customer who shops around from store to store. As a result, it is important to know just what radiation hazards are present in shoe stores which use fluoroscopic equipment and to what extent the hazard can be automatically controlled.

Shoe-fitting fluoroscopes present two distinct radiation problems: (1) the direct radiation received by the customer, and (2) the radiation received by the shoe-store personnel. In the first case, radiation exposure is brief, but relatively intense, with direct radiation centered upon one or both feet, and a certain amount of secondary radiation distributed over the lower part of the body. Conversely, clerks and other personnel in the store are subject principally to secondary radiation in varying quantities, depending on their position and habits during examinations. Frequently, clerks expose themselves unnecessarily to direct radiation as well.

## The Survey

In an effort to determine the radiation hazards surrounding shoe-fitting installations, the author obtained the cooperation of merchants in suburban Washington, and proceeded to examine several shoe-fitting fluoroscopes and to measure their radiation characteristics. All of the fluoroscopes examined were equipped with an automatic switch for terminating the exposure after a predetermined length of time which varied from 10 to 30 seconds. Some of the machines were equipped with a selector switch with three positions (marked "men," "women," and "children"), presumably permitting alteration of milliamperage or kilovoltage. Others, however, were designed for operation at a single exposure rate.

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In the accompanying table, the radiation characteristics of three typical machines are summarized. The total radiation to which a person's foot is subjected during a shoe-fitting examination (at maximum exposure) is indicated as well as the dosage rate in roentgens per second. Considering the very short target-foot distance in these machines, amounting to approximately 6 inches, the high dosage rates indicated are to be expected. Although a thin plate of aluminum is normally interposed between tube and foot in order to control the dosage somewhat, plates have been found in worn-through condition or completely removed.

*Radiation characteristics of shoe-fitting fluoroscopes*

| Machine | Automatic time limit (seconds) | Maximum radiation within time limit—roentgens | | | Radiation rate roentgens per second | | |
|---|---|---|---|---|---|---|---|
| | | Men | Women | Children | Men | Women | Children |
| A | 30 | 23.0 | 19.0 | 15.0 | 0.77 | 0.63 | 0.50 |
| B | 10 | 12.4 | 10 | 5.8 | 1.24 | 1 | .58 |
| C | 17 | 4.5 | 4.5 | 4.5 | .26 | .26 | .26 |

In all cases, secondary radiation through the top and viewing ports, the two sides, and back was found to be negligible. However, a cone of radiation does emanate from the foot recess which is roughly proportional in the different machines to the dosage rates shown in the tabulation. On the average, this radiation was about 20 milliroentgens per minute at a distance of 3 feet from the foot recess when there is no foot in position, and from two to four times this amount when a foot is being examined. Thus, the secondary radiation immediately behind the customer may be as much as 50 to 100 milliroentgens per minute. Since the maximum permissible radiation dosage rate is defined as 300 milliroentgens per week,[1] it is clear that this safety limit could easily be exceeded by a clerk who regularly takes up a position in this region after some 20 to 40 fittings requiring only 10-second exposures.

In all probability, exposure to secondary radiation of this magnitude is unlikely in actual practice, since the control panel is so located that the clerk cannot operate the machine while standing in the region of secondary radiation. However, several store managers pointed out that some clerks make a practice of kneeling down beside a customer (especially with a child) in order to hold him or his foot in position. Where this occurs, the clerk exposes himself to secondary radiation over almost his entire body. Furthermore, the clerk who actually holds the customer's foot during the exposure is subjecting his hand to the same high degree of radiation as the customer's foot receives; such an exposure, repeated many times a day, cannot fail in time to result in serious injury.

[1] Handbook 41. Medical X-ray Protection Up to Two Million Volts. U. S. Department of Commerce, National Bureau of Standards, 1949, 48 pp.

## Control Measures

In many parts of the country, health authorities have devised measures for reducing the radiation hazards inherent in shoe-fitting fluoroscopes. The city of New York, for example, requires that the machines be equipped with exposure control devices to limit the exposure sustained by a shoe customer's foot to 2 roentgens. A time switch in these machines is set for 5 seconds, and appropriate milliamperage adjustments are made to limit the dosage to 2 roentgens for the 5-second exposure (see appendix).

Other safety measures are possible as well. The fluoroscope can be placed against a dead wall so that there is no room for anyone other than the customer on that side of the machine. Thus, there will be less chance that others, including clerks, will be exposed to secondary radiation. Finally, care should be taken to see that both the aluminum foot-plate filter and the lead glass between the screen and the viewing ports are intact and in place at all times. The lead glass especially should not be replaced with ordinary plate glass, or removed entirely, as so often happens.

Unfortunately, there is no way to prevent customers from going from one store to another and receiving one or more exposures in each. The city of New York requires the display of warning cards advising against more than three exposures a day or twelve per year. It should be noted, however, that this limit of three exposures per day is predicated on a maximum radiation dosage of 2 roentgens, which is considerably lower than any of the dosages actually encountered in our survey (see table).

It is most important that shoe-store operators be educated about the X-ray equipment which they use in their business. All the merchants approached for permission to study their equipment, with one exception, were eager to cooperate and anxious to be informed of the findings. The one exception stoutly maintained that "there couldn't be any question of danger, since there were no X-rays in the machine anyway—it was just a label."

## APPENDIX

### New York City Sanitary Code

***Amendment to Regulations***

At a meeting of the Board of Health of the Department of Health held February 10, 1948, the following resolution was adopted: Resolved, That new regulations to be known as "Regulations Governing the Operation and Maintenance of Apparatus Used for Shoe Fitting Fluoroscopy," and relating to Section 107a of the Sanitary Code of the City of New York, be and they are hereby adopted to read as follows, effective March 1, 1948:

Regulation 1. Information to be furnished by the applicant. Every application for a permit to maintain or operate one or more machines used for shoe-fitting fluoroscopy shall be made in writing on an official blank to be furnished by the Health Department and must contain the following information:

Address of premises and parts of building where shoe-fitting fluoroscopy machines are located.

Name and address of applicant.

Regulation 2. Protection of operators and attendants. The equipment shall be so constructed that the dosage rate in any region which may be occupied by operators and attendants does not exceed 12.5 milliroentgens per hour. Means shall be provided to prevent operators or attendants from exposing the hands or any other parts of the body to the useful beam. The equipment shall be so located and oriented that scattered radiation from the opening where the feet are placed is not directed toward occupied regions unless suitable protecting screens are interposed.

Regulation 3. The maximum permissible dose per exposure ("exposure" being defined as a single viewing of one pair of shoes on the feet) shall not exceed 2 roentgens. Each machine shall be provided with an automatic timer set to terminate the exposure when said limit of 2 roentgens for such exposure has been reached. There shall not be more than three exposures in any one day, and not more than a total of 12 exposures in 1 year. The machine shall not be used for any purpose other than the examination of the feet with shoes on.

Regulation 4. Meters, controls and safeguards.—Meters and controls shall be provided in order to maintain the milliamperage and kilovoltage within the proper limits. The X-ray tube shall be provided with a filter equivalent to not less than 1.0 mm. aluminum. Safeguards shall be provided to prevent any use of the equipment by persons other than a qualified operator. The permit holder shall take proper means satisfactory to the Department of Health for instructing a salesman in respect to the operation of the machine as to the potential hazards to himself and his customers and the necessity for his having an annual medical examination including blood count.

Regulation 5. Warning sign.—Each machine shall be provided with a conspicuously located sign warning the customer that repeated exposure to X-ray may be harmful. The sign should measure at least 7½ inches by 4½ inches, be placed in a conspicuous position, and contain the following warning in capital letters at least ⅜ of an inch high:

"REPEATED EXPOSURE TO X-RAY MAY BE HARMFUL, INCLUDING THE EXPOSURE OF HUMAN FEET IN SHOES. FLUOROSCOPIC EXAMINATIONS FOR SHOE FITTING SHALL BE LIMITED TO THREE EXPOSURES IN ANY ONE DAY, AND SHALL BE LIMITED TO NOT MORE THAN A TOTAL OF 12 EXPOSURES IN ONE YEAR."

Regulation 6. Permit not transferable.—A permit is issued to a particular person and for one or more machines at a given location and is not valid for use by any other person or in any other place than stated in the permit. All permits issued under section 107a shall expire March 31 annually.

Regulation 7. Revocation of permit.—A permit issued hereunder may be revoked at the discretion of the Board of Health for violation of the Sanitary Code or of any regulation adopted thereunder for such other cause as may be deemed sufficient by the Board of Health.

# Incidence of Disease

*No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring*

## UNITED STATES

### Reports From States for Week Ended March 3, 1951

In collaboration with the Influenza Information Center, National Institutes of Health, the following report has been prepared.

The number of reported cases of influenza for the current week was 10,675 compared with 6,149 for the previous week and 13,967 for the same week last year.

New York City reported 270 cases of influenza for the current week compared with 49 and 23 cases for the preceding 2 weeks, respectively. No significant increase in deaths from all causes has occurred over the past 3-week period. Philadelphia reported 1,191 cases with 12 deaths from influenza for the week ended March 3 compared with 528 cases and 3 deaths for the previous week. The number of deaths from all causes in Philadelphia for the current week was 794 compared with 594 and 536 deaths for the previous 2 weeks. Boston also reported an increase in deaths from all causes, 365 being reported during the current week compared with 285 and 261 for the previous 2 weeks. Cities in the New England area reported an increase of 35 percent in deaths from all causes for the current week compared with the 5-year median, while the cities in the Middle Atlantic States reported a 20 percent increase.

Dr. E. C. Curnen of the Collaborating Laboratory of the Influenza Study Program, Yale University, School of Medicine, reports that acute respiratory infections have been unusually prevalent since early February in many parts of Connecticut. Most of the illnesses have been relatively mild with constitutional as well as respiratory symptoms and a fever which lasted, on the average, for 48 hours. Specimens of serum obtained from seven representative patients in two different university groups have shown a significant increase in antibodies against the FM–1 strain of influenza A-prime virus as measured by the hemagglutination inhibition technique. Among the same patients, significant but less marked increases in titer against the PR–8 strain of influenza virus have also been noted. The State of Connecticut reported 942 cases of influenza for the current week as compared with 35 for the week ended February 24 and 2 for the week ended February 17.

Dr. D. L. Seckinger, District of Columbia Director of Public Health, has reported an outbreak of an influenzalike infection among children in an institution. The first case appeared about 2 weeks ago. In the group of 120 children, 40 have been affected. Symptoms consist of malaise and moderate fever lasting about 5 days. Throat washings are being obtained for isolation of virus.

Dr. John Dingle of the Collaborating Laboratory of the Influenza Study Program, Western Reserve University, Cleveland, reports that illnesses resembling influenza clinically have occurred for the first time in a group of Cleveland families, which have been under continuous observation for more than 2 years. Between February 14 and February 28, there have been 24 such illnesses in a population of 250 individuals. However, the total number of illnesses has not increased in this population over the preceding month despite the appearance of influenzalike illnesses. Influenza virus has been recovered from five of these patients. Immunologic identification of three of the strains through use of chicken antiserum indicates that the strains are in the A-prime group, most closely resembling the 1950 strain but also the FM–1 strain. Similar illnesses have been seen by practicing physicians in the university hospitals since February 20.

Dr. W. L. Halverson, California Director of Public Health, reports that the mild upper respiratory syndrome, previously prevalent in central and northern California, has extended into the southern part of the State. The regional laboratory at Berkeley reports the serological diagnosis by complement fixation reaction of 58 cases of influenza having onset between January 23 and February 14. Most of these cases occurred in the northern part of California. A later report reveals that 93 paired bloods in a group of 255 showed serological evidence of A-prime influenza. Eighty-five of the positive bloods were from nine counties in central California, and eight from four southern counties.

The Sixth Army Medical Laboratory reports that of 16 paired sera from cases in California military installations, 1 showed a rise in titer against type A, 13 against A-prime, and 2 against B. Some sera, in addition to rises against A-prime, also showed an increase in titer against type A.

The Division of Preventive Medicine, Office of the Surgeon General of the Army, reports that during February, 126 of 230 paired serum specimens from Fort Monmouth, N. J., showed a rise in hemagglutination inhibition titer. Eleven of these were against type A, 113 against A-prime, and 2 against B. In the same period, 58 of 306 sera from Fort Dix, N. J., showed a rise in hemagglutination inhibition titer. Four of these were against type A, and 54 were against A-prime strain.

## *Comparative Data For Cases of Specified Reportable Diseases: United States*

[Numbers after diseases are International List numbers 1948 revision]

| Disease | Total for week ended— | | 5-year median 1946–50 | Seasonal low week | Cumulative total since seasonal low week | | 5-year median 1945–46 through 1949–50 | Cumulative total for calendar year— | | 5-year median 1946–50 |
|---|---|---|---|---|---|---|---|---|---|---|
| | Mar. 3, 1951 | Mar. 4, 1950 | | | 1950–51 | 1949–50 | | 1951 | 1950 | |
| Anthrax (062) | 2 | ------ | ------- | (1) | (1) | (1) | (1) | 15 | 2 | 11 |
| Diphtheria (055) | 88 | 144 | 199 | 27th | 3,772 | 5,761 | 8,370 | 865 | 1,490 | 2,012 |
| Encephalitis, acute infectious (082) | 19 | 18 | 10 | (1) | (1) | (1) | (1) | 104 | 107 | 66 |
| Influenza (480–483) | 10,675 | 13,967 | 4,146 | 30th | [2] 50,998 | 50,718 | 50,718 | [2] 36,456 | 40,134 | 40,134 |
| Measles (085) | 16,848 | 9,584 | 18,962 | 35th | [3] 130,946 | 73,715 | 120,113 | [3] 102,245 | 54,585 | 93,989 |
| Meningitis, meningococcal (057.0) | 132 | 86 | 91 | 37th | 1,952 | 1,696 | 1,696 | 991 | 782 | 782 |
| Pneumonia (490–493) | 2,875 | 3,118 | ------- | (1) | (1) | (1) | (1) | [3] 17,294 | 21,777 | ------- |
| Poliomyelitis, acute (080) | 87 | 81 | 52 | 11th | 33,303 | 42,446 | 25,336 | 1,084 | 972 | 539 |
| Rocky Mountain spotted fever (104) | ------ | 2 | 2 | (1) | (1) | (1) | (1) | 2 | 8 | 6 |
| Scarlet fever (050) [4] | 2,586 | 1,938 | 2,932 | 32d | 36,015 | 32,215 | 47,485 | 20,324 | 15,776 | 23,737 |
| Smallpox (084) | 1 | 1 | 4 | 35th | 15 | 21 | 50 | 7 | 11 | 29 |
| Tularemia (059) | 15 | 20 | 20 | (1) | (1) | (1) | (1) | 129 | 206 | 206 |
| Typhoid and paratyphoid fever (040, 041) [5] | 36 | 45 | 45 | 11th | 3,256 | 3,781 | 3,781 | 341 | 408 | 383 |
| Whooping cough (056) | 1,734 | 2,962 | 2,142 | 39th | 36,449 | 43,996 | 43,996 | 14,847 | 22,460 | 20,136 |

[1] Not computed.
[2] Deduction: Nevada, week ended Feb. 10, 36 cases.
[3] Additions: Measles—Nevada, week ended Feb. 17, 1 case; pneumonia—Nevada, week ended Feb. 17, 10 cases—Alabama, week ended Feb. 24, 73 cases.
[4] Including cases reported as streptococcal sore throat.
[5] Including cases reported as salmonellosis.

## Reported Cases of Selected Communicable Diseases: United States, Week Ended Mar. 3, 1951

[Numbers under diseases are International List numbers, 1948 revision]

| Area | Diphtheria (055) | Encephalitis, infectious (082) | Influenza (480–483) | Measles (085) | Meningitis, meningococcal (057.0) | Pneumonia (490–493) | Poliomyelitis (080) |
|---|---|---|---|---|---|---|---|
| **United States** | **88** | **19** | **10,675** | **16,848** | **132** | **2,875** | **87** |
| **New England** | **1** | | **1,699** | **899** | **3** | **105** | |
| Maine | | | 508 | 2 | | 36 | |
| New Hampshire | | | 166 | 120 | | 3 | |
| Vermont | | | 54 | 217 | 1 | | |
| Massachusetts | 1 | | | 476 | 1 | | |
| Rhode Island | | | 29 | 2 | | | |
| Connecticut | | | 942 | 82 | 1 | 66 | |
| **Middle Atlantic** | **13** | **9** | **409** | **2,177** | **14** | **463** | **13** |
| New York | 7 | 6 | [1] 270 | 775 | 6 | 216 | 9 |
| New Jersey | 1 | 3 | 139 | 479 | 1 | 104 | 1 |
| Pennsylvania | 5 | | | 923 | 7 | 143 | 3 |
| **East North Central** | **4** | **3** | **102** | **3,141** | **19** | **165** | **5** |
| Ohio | | | | 850 | 10 | | |
| Indiana | 3 | 1 | 3 | 157 | | 13 | 2 |
| Illinois | | | 14 | 584 | 3 | 91 | 2 |
| Michigan | 1 | 2 | 85 | 674 | 3 | 61 | 1 |
| Wisconsin | | | | 876 | 3 | | |
| **West North Central** | **4** | **2** | **32** | **927** | **8** | **84** | **6** |
| Minnesota | 2 | | 2 | 91 | 3 | 6 | |
| Iowa | | | | 44 | 1 | 8 | 3 |
| Missouri | 1 | | 1 | 392 | 1 | 3 | |
| North Dakota | | 2 | 6 | 93 | 1 | 62 | |
| South Dakota | | | | 26 | 1 | | |
| Nebraska | | | | 27 | | | 1 |
| Kansas | 1 | | 23 | 254 | 1 | 5 | 2 |
| **South Atlantic** | **24** | **3** | **2,596** | **1,228** | **28** | **586** | **20** |
| Delaware | 1 | | 38 | 54 | | | |
| Maryland | | | 9 | 78 | 2 | 47 | 1 |
| District of Columbia | | | 3 | 49 | | 19 | |
| Virginia | 4 | | 832 | 350 | 5 | 138 | 2 |
| West Virginia | 5 | | 598 | 144 | 1 | 20 | 2 |
| North Carolina | 7 | | | 209 | 6 | | 4 |
| South Carolina | 2 | | 302 | 16 | 4 | 40 | |
| Georgia | 5 | 3 | 814 | 303 | 9 | 322 | 8 |
| Florida | | | | 25 | 1 | | 3 |
| **East South Central** | **10** | | **145** | **409** | **18** | **149** | **3** |
| Kentucky | 4 | | 7 | 171 | 10 | 34 | |
| Tennessee | | | 66 | 53 | 3 | | |
| Alabama | 1 | | | 16 | 3 | 70 | 1 |
| Mississippi | 5 | | 72 | 169 | 2 | 45 | 2 |
| **West South Central** | **28** | **2** | **1,563** | **3,912** | **20** | **999** | **7** |
| Arkansas | 4 | | 613 | 273 | 1 | 72 | |
| Louisiana | 4 | 2 | 739 | 215 | 2 | 83 | 5 |
| Oklahoma | 1 | | 211 | 364 | 3 | 60 | |
| Texas | 19 | | | 3,000 | 14 | 784 | 2 |
| **Mountain** | **1** | | **1,942** | **1,665** | **4** | **185** | **5** |
| Montana | | | 38 | 80 | | | |
| Idaho | | | | 55 | | | |
| Wyoming | | | | 35 | | | |
| Colorado | | | 20 | 883 | 3 | 55 | 4 |
| New Mexico | | | | 51 | | 17 | |
| Arizona | 1 | | 1,853 | 485 | 1 | 113 | |
| Utah | | | | 61 | | | 1 |
| Nevada | | | 31 | 15 | | | |
| **Pacific** | **3** | | **2,187** | **2,490** | **18** | **139** | **28** |
| Washington | 1 | | 705 | 676 | 1 | 2 | |
| Oregon | 1 | | 1,249 | 33 | 2 | 46 | 3 |
| California | 1 | | 233 | 1,781 | 15 | 91 | 25 |
| Alaska | | | 5 | | | | |
| Hawaii | | | 7 | 7 | | | 1 |

[1] New York City only.

*Anthrax:* California, 1 case; New York, 1 case.

## Reported Cases of Selected Communicable Diseases: United States, Week Ended Mar. 3, 1951—Continued

[Numbers under diseases are International List numbers, 1948 revision]

| Area | Rocky Mountain spotted fever (104) | Scarlet fever (050) | Smallpox (084) | Tularemia (059) | Typhoid and paratyphoid fever [1] (040, 041) | Whooping cough (056) | Rabies in animals |
|---|---|---|---|---|---|---|---|
| **United States** | --- | 2,586 | 1 | 15 | 36 | 1,734 | 128 |
| **New England** | --- | 215 | --- | --- | --- | 121 | --- |
| Maine | --- | 13 | --- | --- | --- | 82 | --- |
| New Hampshire | --- | [2] 7 | --- | --- | --- | 8 | --- |
| Vermont | --- | 4 | --- | --- | --- | 11 | --- |
| Massachusetts | --- | 143 | --- | --- | --- | 42 | --- |
| Rhode Island | --- | 10 | --- | --- | --- | 20 | --- |
| Connecticut | --- | 38 | --- | --- | --- | 8 | --- |
| **Middle Atlantic** | --- | 407 | --- | 2 | 10 | 240 | 14 |
| New York | --- | [2] 223 | --- | --- | 5 | 93 | 12 |
| New Jersey | --- | 57 | --- | --- | 2 | 61 | --- |
| Pennsylvania | --- | 127 | --- | 2 | 3 | 86 | 2 |
| **East North Central** | --- | 816 | --- | 2 | 2 | 257 | 6 |
| Ohio | --- | 255 | --- | --- | --- | 69 | 2 |
| Indiana | --- | 64 | --- | --- | 1 | 7 | --- |
| Illinois | --- | 116 | --- | 2 | 1 | 12 | 1 |
| Michigan | --- | 314 | --- | --- | --- | 92 | 3 |
| Wisconsin | --- | 67 | --- | --- | --- | 77 | --- |
| **West North Central** | --- | 140 | --- | 1 | 3 | 79 | 11 |
| Minnesota | --- | 32 | --- | --- | --- | 24 | 2 |
| Iowa | --- | 15 | --- | --- | 2 | 12 | 9 |
| Missouri | --- | 56 | --- | 1 | --- | 8 | --- |
| North Dakota | --- | 7 | --- | --- | --- | 4 | --- |
| South Dakota | --- | --- | --- | --- | --- | 3 | --- |
| Nebraska | --- | 7 | --- | --- | 1 | --- | --- |
| Kansas | --- | 23 | --- | --- | --- | 28 | --- |
| **South Atlantic** | --- | 224 | --- | 6 | 5 | 266 | 17 |
| Delaware | --- | 5 | --- | --- | --- | --- | --- |
| Maryland | --- | 30 | --- | 1 | 2 | 14 | --- |
| District of Columbia | --- | 20 | --- | --- | 1 | 4 | --- |
| Virginia | --- | 34 | --- | --- | --- | 83 | 4 |
| West Virginia | --- | 13 | --- | --- | --- | 47 | 3 |
| North Carolina | --- | 78 | --- | --- | --- | 69 | --- |
| South Carolina | --- | 8 | --- | --- | 1 | 8 | 6 |
| Georgia | --- | 27 | --- | 5 | 1 | 32 | 3 |
| Florida | --- | [2] 9 | --- | --- | --- | 9 | 1 |
| **East South Central** | --- | 101 | --- | 1 | 5 | 58 | 29 |
| Kentucky | --- | 39 | --- | --- | 2 | 16 | 16 |
| Tennessee | --- | 52 | --- | --- | 1 | 5 | 12 |
| Alabama | --- | 1 | --- | --- | 2 | 32 | --- |
| Mississippi | --- | 9 | --- | 1 | --- | 5 | 1 |
| **West South Central** | --- | 96 | --- | 1 | 7 | 550 | 50 |
| Arkansas | --- | 5 | --- | 1 | 1 | 52 | 6 |
| Louisiana | --- | 10 | --- | --- | --- | 1 | --- |
| Oklahoma | --- | 28 | --- | --- | 1 | 31 | 3 |
| Texas | --- | 53 | --- | --- | 5 | 466 | 41 |
| **Mountain** | --- | 154 | 1 | 2 | --- | 110 | --- |
| Montana | --- | 1 | --- | --- | --- | 9 | --- |
| Idaho | --- | 27 | 1 | --- | --- | 3 | --- |
| Wyoming | --- | --- | --- | 1 | --- | 4 | --- |
| Colorado | --- | 16 | --- | --- | --- | 11 | --- |
| New Mexico | --- | 3 | --- | --- | --- | 17 | --- |
| Arizona | --- | 8 | --- | --- | --- | 56 | --- |
| Utah | --- | [2] 98 | --- | 1 | --- | 10 | --- |
| Nevada | --- | 1 | --- | --- | --- | --- | --- |
| **Pacific** | --- | 433 | --- | --- | 4 | 53 | 1 |
| Washington | --- | 127 | --- | --- | 1 | 12 | --- |
| Oregon | --- | 61 | --- | --- | 1 | 6 | --- |
| California | --- | [2] 245 | --- | --- | 2 | 35 | 1 |
| Alaska | --- | 1 | --- | --- | --- | --- | --- |
| Hawaii | --- | --- | --- | --- | --- | --- | --- |

[1] Including cases reported as salmonellosis.
[2] Including cases reported as streptococcal sore throat.

# FOREIGN REPORTS

## CANADA

*Reported Cases of Certain Diseases—Week Ended Feb. 17, 1951*

| Disease | Total | Newfoundland | Prince Edward Island | Nova Scotia | New Brunswick | Quebec | Ontario | Manitoba | Saskatchewan | Alberta | British Columbia |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Brucellosis | 2 | | | | | 1 | 1 | | | | |
| Chickenpox | 1,233 | 1 | | 19 | | 263 | 661 | 41 | 19 | 82 | 147 |
| Diphtheria | 3 | | | | | 3 | | | | | |
| Dysentery, bacillary | 10 | 1 | | | | 6 | 2 | 1 | | | |
| German measles | 471 | | | 59 | | 34 | 241 | 4 | 18 | 58 | 57 |
| Influenza | 7,290 | 17 | | 3,407 | 3,192 | | 317 | 13 | 298 | | 46 |
| Measles | 2,881 | 4 | | 42 | 1 | 397 | 2,181 | 151 | 18 | 33 | 54 |
| Meningitis, meningococcal | 7 | | | | 3 | 2 | 1 | | | | 1 |
| Mumps | 1,505 | | | 23 | | 334 | 454 | 56 | 91 | 255 | 292 |
| Scarlet fever | 376 | 3 | | | 1 | 98 | 54 | 26 | 15 | 70 | 109 |
| Tuberculosis (all forms) | 146 | 10 | | 2 | 5 | 33 | 20 | 13 | 4 | 8 | 51 |
| Typhoid and paratyphoid fever | 26 | | | | | 8 | 1 | | | 1 | 16 |
| Venereal diseases: | | | | | | | | | | | |
| Gonorrhea | 257 | 5 | | 8 | 6 | 51 | 52 | 12 | 8 | 35 | 80 |
| Syphilis | 90 | 2 | | 2 | 2 | 35 | 21 | 7 | 7 | 2 | 12 |
| Primary | 2 | | | | | | 2 | | | | |
| Secondary | 3 | | | | | | 3 | | | | |
| Other | 85 | 2 | | 2 | 2 | 35 | 16 | 7 | 7 | 2 | 12 |
| Whooping cough | 172 | | | 23 | 2 | 22 | 84 | 17 | 7 | 3 | 14 |

## CUBA

*Reported Cases of Certain Diseases—5 Weeks Ended Dec. 30, 1950*

| Disease | Pinar del Rio | Habana | | Matanzas | Santa Clara | Camaguey | Oriente | Total |
|---|---|---|---|---|---|---|---|---|
| | | Habana City | Total | | | | | |
| Cancer | 5 | | 28 | 21 | 29 | 2 | 21 | 106 |
| Chickenpox | | 9 | 9 | 1 | | | 4 | 14 |
| Diphtheria | 1 | 9 | 15 | 5 | 2 | 1 | 6 | 30 |
| Leprosy | | | 2 | 8 | 1 | | | 11 |
| Malaria | | 1 | 1 | | 7 | 3 | 393 | 404 |
| Measles | | 19 | 19 | 1 | | 1 | 9 | 30 |
| Poliomyelitis | 1 | | | | 1 | 1 | | 3 |
| Tuberculosis | 1 | | 20 | 37 | 17 | 8 | 20 | 103 |
| Typhoid fever | 2 | 11 | 13 | 2 | 5 | 1 | 9 | 32 |
| Whooping cough | | | 26 | | | | | 26 |

## JAMAICA

*Reported Cases of Certain Diseases—4 Weeks Ended Jan. 27, 1951*

| Disease | Kingston | Other localities | Total |
|---|---|---|---|
| Chickenpox | 4 | 14 | 18 |
| Diphtheria | 2 | 1 | 3 |
| Dysentery, unspecified | | 1 | 1 |
| Leprosy | | 4 | 4 |
| Ophthalmia neonatorum | 1 | | 1 |
| Puerperal sepsis | | 1 | 1 |
| Tuberculosis, pulmonary | 35 | 43 | 78 |
| Typhoid fever | 15 | 45 | 60 |
| Typhus fever (murine) | 1 | | 1 |

## REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

**The following reports include only items of unusual incidence or of special interest and the occurrence of these diseases, except yellow fever, in localities which had not recently reported cases. All reports of yellow fever are published currently. A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.**

### Cholera

*India (French).* During the week ended February 17, 1951, 36 cases of cholera were reported in Pondicherry as compared with 17 for the previous week. Karikal reported 12 cases for the week ended February 17 and 3 cases for the week ended February 10.

### Plague

*Indochina.* During the week ended February 24, 1951, one case of plague was reported in Phanthiet, Viet Nam.

### Smallpox

*Burma.* Smallpox was reported in ports of Burma for the week ended February 24, 1951, as follows: Akyab 10 cases, Kyaukpyu 31, Moulmein 7, and Rangoon 9.

*India.* The incidence of smallpox in ports of India in general continues to increase. Seaports in which unusually large numbers of cases were reported for the week ended February 24, 1951 (figures in parentheses are for the previous week), are as follows: Calcutta 656 (637), Bombay 89 (72), and Madras 76 (79). The airport of Nagpur reported a decrease from 108 cases for the week ended February 10 to 73 for the week ended February 17.

*India (French).* During the week ended February 17, 1951, smallpox cases (176) in Pondicherry more than doubled the number (67) reported for the previous week.

## Course in Internal Medicine

A 2-week course in Recent Advances in Internal Medicine is being offered April 30 to May 12, 1951, by the Michael Reese Hospital Postgraduate School, Chicago. Clinical and didactic material pertaining to recent advances in diagnosis and therapy will be presented by members of the Department of Internal Medicine, other Clinical Departments, and the Division of Laboratories and Research.

For further information address: Dr. Samuel Soskin, Dean, Twenty-ninth Street and Ellis Avenue, Chicago 16, Ill.

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The PUBLIC HEALTH REPORTS, first published in 1878 under authority of an act of Congress of April 29 of that year, is issued weekly by the Public Health Service through the Division of Public Health Methods, pursuant to the following authority of law: United States Code, title 42, sections 241, 245, 247; title 44, section 220.

It contains (1) current information regarding the incidence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable disease throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

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# Public Health Reports

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FEDERAL SECURITY AGENCY

PUBLIC HEALTH SERVICE

FEDERAL SECURITY AGENCY
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PUBLIC HEALTH SERVICE
*Leonard A. Scheele, Surgeon General*

**Division of Public Health Methods**
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# Public Health Reports

*Vol. 66* • MARCH 30, 1951 • *No. 13*

## The Potentialities of Biological Warfare Against Man

### —An Epidemiological Appraisal—

By ALEXANDER D. LANGMUIR, M.D.*

In December 1950, the Executive Office of the President issued the manual, Health Services and Special Weapons Defense, (*1*). This Manual categorically states "an enemy could employ . . . biological warfare against us effectively." As the official position of the Government, this statement deserves the due respect of every citizen regardless of his previous opinions or preconceived ideas. In this country, however, each citizen has the right critically to examine any statement of his Government and to arrive at his own judgment in the light of his past experience and of the available evidence. The publication of the Manual places the problem of biological warfare squarely before the people for serious deliberation and appropriate action.

The Manual does not purport to be a scientific document. No evidence is marshalled to support its many generalizations. Rather it is a set of organized conclusions followed by broad recommendations. Large responsibilities are indicated for the medical, public health, and related professions. To participate effectively, these responsible professions must understand and agree to the scientific principles underlying the conclusions and forming the basis for the recommended defense measures.

At present, the discussion of biological warfare raises strong emotional reactions and evokes bitter controversy. Informed opinions vary in the extreme. It would be futile to argue about the many claims and counter claims that have been presented to the public. Rather the first necessity is to seek for some common ground based on experimental observations and rationally organized epidemiological principles. We need a logical statement of a "theory of biological warfare." If only a small area could be defined to which all professionally qualified persons could agree, this would form the basis for such a theory. Only when this has been achieved can the building of a sound defense program be started. It would provide a base of

*From the Communicable Disease Center, Public Health Service, Atlanta, Ga. Presented before in-service training course in public health and preventive medicine, University of Kansas Medical Center, Kansas City, Kans., February 12, 1951.

reference for judging new problems. Priorities for assignment of limited personnel and critical materials could be established. Research problems could be defined.

Previous attempts to develop a scientific basis for a theory of biological warfare have been made. Rosebury and Kabat published a lengthy review (*2*) on the subject in 1947. This work was based on the unclassified information available up to 1942. Also in 1947, Rosebury published a second monograph (*3*) entitled, "Experimental Airborne Infection." This is a detailed scientific account of experimental work conducted at the Biological Warfare Research Laboratory of the Army at Camp Detrick during the war years. In 1949, Rosebury published a popular book, Peace or Pestilence (*4*), in which he develops at length his concept of a theory of biological warfare. In November 1950, Capt. F. R. Philbrook, U. S. N., presented a considered appraisal of the subject (*5*) at a meeting of the American Public Health Association, but this has yet to be published in full.[1]

Several hundred scientific papers have been published from Camp Detrick. These have direct application to our present problem. The author is unaware, however, of any comprehensive scientific statement of the broad aspects of the problem that has been published from this official source. The few official statements—such as the Merck Report, 1946 (*6*), and the Forrestal Statement, 1949 (*7*), and others—announce the existence of a research and development program on biological warfare and state generalizations and conclusions.

None of these published papers and statements has resolved the basic controversy that exists among qualified scientists over the potentialities of biological warfare. The present paper is one more attempt to search for a common ground of agreement.

## Forms of Biological Warfare

The Manual emphasizes two major forms of possible biological warfare attack: (1) The creation of clouds of pathogenic aerosols over cities, and (2) the contamination of our water or food supplies or the air of strategic buildings by sabotage. The first would be designed to produce large numbers of casualties in urban areas. The second would be directed at localized groups to incapacitate key individuals and industries or to create hysteria and undermine public morale.

The agents an enemy might use are not specified but the Manual states "a wide variety of viruses, rickettsiae, bacteria, fungi, protozoa, and soluble toxins . . . might be employed." No mention is made of a hypothetical new agent of unknown characteristics and "super virulence." Such a concept lies in the realm of pure speculation. Moreover, the concept that a self-propagating epidemic might be ini-

[1] Subsequent to the presentation of this paper, a comprehensive statement, Medical Aspects of Civil Defense in Biologic Warfare, by Victor H. Haas, has been published in J. A. M. A. 145:900–905 (1951).

tiated is seriously questioned on two grounds: (1) The doubt that such an epidemic could be started, and (2) the confidence that a strengthened public health organization could promptly control one if it did get started. Thus, the most controversial aspects of biological warfare, the super agent and the uncontrollable epidemic, may be dismissed from the present consideration as not pertinent to the search for a common ground of agreement.

Our problem may be limited to known disease agents and the potentialities of their effective use either by inhalation or ingestion. The scientific basis for a critical appraisal of this problem lies in our knowledge of the epidemiology of airborne infections and of common-vehicle epidemics.

## The Epidemiology of Airborne Infection

The importance of air as a mode of spread of naturally occurring disease has been a long disputed question. Prior to 1890, it was a general belief, both among scientifically informed persons and the general public, that the air was the dominant mode of spread of infection. This is indicated by the general terms "miasma" meaning noxious vapors and "malaria" meaning bad air. With the advent of bacteriology, however, this belief rapidly disappeared. Although bacteria were found in air by Pasteur, these turned out to be mostly harmless saprophytes. Thorough studies of bacteria in the air were conducted by Fluegge and others in Europe and by Chapin and Winslow and others in this country. It was shown that whole rooms, or even buildings, could be readily contaminated by a spray of such harmless organisms as *B. prodigiosus*, but the weight of the evidence suggested that most pathogenic bacteria either rapidly died or lost their virulence when exposed to air. The attitude of most informed workers in the field swung strongly away from the concept of airborne infection toward the importance of contact and droplets (*8*). This attitude has remained the dominant concept up to the present time.

Approximately 15 years ago several investigators made a concerted attempt to challenge this concept. Wells and Robertson in this country and Allison and Cruickshank in Great Britain and numerous other workers conducted extensive experiments of the mechanisms of airborne infection. A large amount of highly suggestive experimental data has been accumulated. Real advances in the disinfection of the air by means of controlled ventilation, ultraviolet irradiation, glycol vapors, and dust suppression have been accomplished.

The application of these engineering methods to the control of naturally occurring disease in general population groups, however, has been most disappointing. It remains to be proved that airborne infection is an important mode of spread of naturally occurring

disease. The challenge to the theory of contact and droplet infection has largely failed (*9*).

Nevertheless the knowledge accumulated during the past 15 years has clearly laid the scientific basis for the mechanisms of airborne infection. This mode of spread is now an established reality in the experimental laboratory and is known to be a common cause of accidental or artificially induced human infections. Of particular importance to our present problem are the physical principles of the penetration and retention of particulates in the respiratory tract and the study of accidental laboratory infections.

### *Experimental Demonstrations of Airborne Infection*

Numerous infections have been transmitted to animals and to man by the airborne route under strictly controlled conditions. For example, in 1926 Dunkin and Laidlaw (*10*), working with the virus of canine distemper, showed that the airborne route of infection readily occurred and extreme precautions were necessary to obtain consistent laboratory results. The viruses of influenza A and B readily infect mice and ferrets by inhalation. Lurie has repeatedly demonstrated direct airborne infection of rabbits with the tubercle bacillus. In a recent paper, Lurie and his co-workers have beautifully shown that one tubercle results in the rabbit lung for each estimated viable tubercle bacillus that reaches the alveoli (*11*).

The extensive studies of Rosebury (*3*) from Camp Detrick show that experimental animals can be readily infected with *Br. suis*, *M. mallei*, *M. pseudomallei*, *P. tularense*, and psittacosis virus by the inhalation of minute doses of agent.

Several diseases have been accidentally shown to be airborne in man. For example, when the Commission on Acute Respiratory Diseases during World War II attempted to transmit primary atypical pneumonia to a group of human volunteers by inhalation of a fine spray, several cases developed concurrently among volunteers who had received only control inoculations and also among staff members and assistants who received no inoculations. Similarly, measles, German measles, and influenza have spread to individuals in the same environment where volunteers were receiving spray inoculations of infectious secretions. The conditions of these experiments exclude other possible routes of infection except the air.

### *Accidental Laboratory Infections*

Research scientists have long recognized the occurrence of accidental infections as an occupational hazard which they have willingly accepted as a calculated risk. Recent studies of Sulkin and Pike (*12, 13*) reveal the extent and seriousness of this problem. A number of different pathogenic agents are notorious offenders. Attack rates

have been high and many fatalities have been recorded. The agents include those causing brucellosis, tularemia, Q fever, typhus fever, Rocky Mountain spotted fever, psittacosis, yellow fever, and certain of the encephalitides, coccidioidomycosis, and many others.

Until recently the commonly accepted mode of transmission of these accidental infections was contact, resulting from errors of technique. Much evidence supported this view. Many infections have been observed to follow relentlessly upon such incidents as the aspiration into the mouth of a virulent culture during pipetting, or the nicking of the hand during an autopsy, or the jabbing of a finger during animal inoculation, or the gross contamination of the whole environment when a flask of agent was spilled or broken in a centrifuge.

Numerous laboratory infections have occurred, however, in the absence of known breaks in technique, even when extreme precautions were being consistently followed. While the explanation of these incidents was obscure, they were usually summarized by the general concept that such agents were "extraordinarily infectious" or that they had the capacity to penetrate through unbroken skin. Although contamination of the air was sometimes implicated, many research workers were reluctant to accept this explanation.

Of special interest are the occasional explosive epidemics that have occurred in research laboratories. These have involved large numbers of persons in widely separated rooms and have occurred under circumstances that adequately preclude direct contact. Three dramatic incidents from a much larger group will be summarized.

A. A psittacosis outbreak of 11 cases occurred in the Hygienic Laboratory of the U. S. Public Health Service between January 25 and March 15, 1930 (*14*). The cases were confined to the 54 individuals working in 1 building while 67 persons in 2 neighboring buildings escaped infection. Infected parrots and parakeets had been shipped to the laboratory for study. Work began January 16. Five individuals handled the birds or attempted cultural work, and three became ill. The remaining eight cases worked in other laboratories in the building and had no known contact with infected material. Seven cases had onsets within a 6-day period from March 10–15, indicating a common source exposure early in March. Dr. C. W. McCoy, in his first brief account of the epidemic, concluded that the cause was unexplained but that "this occurrence suggests the infectiveness of the virus of psittacosis for man is of a very high order." In a later, more comprehensive report of the outbreak, Dr. McCoy considers carefully the possibility that airborne infection was the cause of the epidemic but he was clearly reluctant to accept this explanation (*15*).

B. An epidemic of brucellosis caused by *Br. melitensis* occurred at the Michigan State College in East Lansing between December 10, 1938, and February 10, 1939. A total of 45 clinical cases and 44 subclinical infections were recognized. The diagnosis was confirmed by the isolation of the organism from the blood culture in 38 instances. All cases were associated with one bacteriological laboratory building. Thirty-eight of the 45 clinical cases were students, taking one or more of several general courses. Of these, 32 were concentrated in 3

laboratory sections, comprising a total of 102 students, thus indicating the substantial clinical attack rate of more than 30 percent. The other cases were among laboratory personnel and one salesman who stayed only long enough "to leave advertising matter." None of the students was issued *Brucella* in his laboratory exercises and only a few had exposure in the *Brucella* laboratory located in the basement. In this area, however, large volumes of *Brucella* cultures were being prepared into antigens and skin-test materials. Approximately one month before the epidemic, *Br. melitensis* had been concentrated in an "enclosed Sharples centrifuge," located in the basement hall.

Two accounts of this epidemic have been published. One (*16*) argues that a mass contamination occurred as result of backsiphonage of the water sytem with resultant contamination of the water from a sink where glassware was washed. No epidemiological confirmation of this explanation was obtained, however, such as showing that the cases occurred only among those who may have drunk water during their laboratory courses and not among those who did not drink water while in the building. The other report (*17*) argues strongly against backsiphonage, stating that it could be demonstrated only under extraordinary circumstances which did not apply during the period immediately preceding the epidemic. This second report concludes that a "mass infection" occurred and that critical analysis of the available evidence failed to substantiate how the epidemic originated. The authors did not discuss the possibility that the Sharples centrifuge may have caused the "mass infection" (*18*).

C. An epidemic of 47 cases of Q fever occurred in the Infectious Disease Laboratory of the National Institutes of Health between December 17, 1945, and May 30, 1946 (*19*). The diagnosis was confirmed by the isolation of the rickettsiae in six instances and by serological means in all cases Forty-four of the cases occurred among 142 employees of building 5 and three cases appeared among individuals who had visited the building within 28 days preceding the onset of their disease. The cases were distributed throughout the building, but there was a greater concentration among those working on the first floor where the Q Fever Laboratory was located. Concurrently, two guinea pig colonies, one on the first floor and one in the attic, became spontaneously infected.

An epidemiological correlation was found between the dates when infected yolk sacs were prepared into antigens by centrifugation and the probable dates of exposure of the cases. The mechanism by which the mass contamination of the entire building occurred was not explained by the author of this report although in a previous epidemic of Q fever in the Hygienic Laboratory in Washington in 1940, airborne infection was considered the most probable explanation (*20*).

For a long time research scientists have been reluctant to accept the explanation of airborne infection for many of these unexplained laboratory infections and epidemics. At the present time, however, the importance of aerial contamination is widely accepted as indicated by the extreme precautions that are being taken when highly infective agents are under study. The new infectious disease laboratory at the National Institutes of Health in Bethesda, Md. is a monument to those who have died from laboratory acquired disease. In this building specially designed hoods, controlled ventilation with the incineration of exhaust air, and the utilization of properly placed

ultraviolet lights indicate the extent to which the hazard of airborne infection has been appreciated.

Important in this progressive change in attitude has been the association of accidents with particular types of laboratory procedures such as intranasal instillations, centrifugation of infectious agents and the grinding of tissues in the Waring Blendor. It is now known that these procedures often produce invisible clouds of finely dispersed infectious aerosols which, if uncontrolled, can be carried on air currents throughout a large building.

Of special interest are the studies of Johansson and Ferris (*21*) and Wedum (*22*) who worked at Camp Detrick, Md. These workers showed that even such simple routine procedures as removing a cotton plug from a flask or the transferring of cultures from one tube to another, the withdrawing of a hypodermic needle from a rubber-stoppered vial, or blowing the last drop from a pipette produced aerosols of varying extent and concentration. These studies illustrate in a graphic fashion the manifold opportunities for aerial contamination that exist in laboratories and provide a ready explanation for the occurrence of accidental infection by the airborne route.

*The Retention of Particulates in the Lung*

The relation between the size of inhaled particles and the depth of their penetration and retention in the respiratory tract has unique application to the theory of biological warfare.

Theoretical calculations applying established physical principles to the known dimensions of the respiratory tract (*23*) and experimental studies using a variety of different techniques (*24*), including radioactive isotopes (*25*), have led to essentially similar results (*26*). They show that the respiratory tract is an exceptionally good filter, considering the volume of air that passes through it.

Particles larger than 5 microns in diameter are almost completely removed in the nose and upper respiratory passages. Below 5 microns in size, progressively increasing proportions of inhaled particles reach the terminal bronchioles and alveoli; in the range of 1 micron some 50 to 60 percent penetrate to the alveoli and are trapped there. Below this range, alveolar deposition again decreases because more particles are exhaled. In the submicroscopic range below 0.25 micron an increase in retention is theoretically expected because Brownian movement comes into greater action.

The fate of inhaled particles larger than 5 microns is quite different from that of smaller particles. Those that impinge on the mucus overlying ciliated epithelium are wafted to the oropharynx where they are most likely to be swallowed or occasionally expectorated. Those that impinge in the anterior chamber of the nose will be wafted to the external nares. The smaller particles that are retained beyond

the ciliated epithelium must be removed by tissue mechanisms, principally phagocytosis. Thus, for toxic substances such as silica, minerals, or metallic poisons and for those pathogenic agents not normally infective through an upper respiratory portal of entry, inhalation of large particles is essentially equivalent to a slow gastrointestinal instillation or ingestion. Inhalation of particles progressively smaller than 5 microns becomes increasingly similar to an intratissue or subcutaneous inoculation.

In industrial hazards such as silicosis, it is now generally recognized that the proportion of small particles in the air is of much greater importance than the total concentration of silica. The smaller the particle even to submicroscopic dimensions, the greater the pulmonary damage for a given weight of silica retained. This suggests that surface area is the important factor in the pathogenesis of this disease. An essentially similar relation has been found in pulmonary berylliosis and in metallic fume poisoning (*27*).

These principles have direct application to airborne infection. Numerous infective agents such as the streptoccocus, diphtheria bacillus, and the influenza viruses have the capacity to invade through the respiratory epithelium or through the tonsillar tissues of the oropharynx. Airborne particles, large and small, can reach these sites not only by inhalation but also by direct contact. These diseases occur universally throughout the world in endemic and epidemic forms. The resistance and immunity of a large portion of the population to them is high. They are not seriously considered as likely biological warfare agents.

In contrast, many infectious agents, particularly those known to be serious hazards in the laboratory, do not normally invade these sites in the upper respiratory tract. Rather the natural form of infection is a direct inoculation by insect bite as with typhus fever, Rocky Mountain spotted fever, and yellow fever, or by known breaks in the skin as in cutaneous tularemia of rabbit hunters. The inhalation of these infectious agents in particles sufficiently fine to reach the alveoli of the lung, thus becomes equivalent, as explained above, to a subcutaneous inoculation. Thus, minute doses of these agents may induce active infection when inhaled in sufficiently small particles. The inhalation of larger particles would lead to eventual ingestion. While the gastrointestinal tract may be a possible portal of entry for some of these diseases, such as brucellosis, tularemia, and even psittacosis, abundant laboratory evidence indicates that the necessary minimum infecting doses by this route are many hundreds or thousands of times greater than by inhalation.

These diseases are highly localized in their distribution and a very high proportion of the population of this country is known to be susceptible. They form a group that should receive first considera-

tion as agents which might be employed against us in biological warfare.

It should be emphasized that the upper limit to the size of particles that can reach the alveoli, namely 5 microns, is strikingly similar to the dimensions of single bacterial cells, fungal spores, rickettsiae, and virus elementary bodies. This association should not be considered as mere coincidence, but rather as a fact of particular biological significance. The mammalian lung is an intricate structure that has developed by the evolutionary process of natural selection. Its dimensions have been determined, on the one hand, by the viscosity of air and the physiological needs of respiration; and, on the other hand, by the obvious necessity to filter out most other noxious particulate matter. The fact that the human lung successfully removes particles larger than single bacterial cells should be regarded as one of the many factors contributing to the survival of the species.

Furthermore, pathogenic agents rarely exist in nature as single cells; rather, they tend to grow in clumps or chains. They are almost always intimately mixed with mucus, pus, saliva, feces, or other moist organic matter. This means that when they are extruded into the open environment, they tend rapidly to adhere to surfaces or to inert particles of dirt, dust, or lint and thereby become even larger. Although certain exceptions to this general principle can be visualized, it is an entirely reasonable conclusion that single pathogenic cells are only rarely dispersed into the air under natural circumstances; rather, it would seem that the human species has not been forced to contend with a wide variety of finely dispersed bacterial aerosols and therefore has not faced the biological necessity of developing a natural mechanism to defend against them.

Artificial circumstances present an entirely different picture. Using modern laboratory techniques, many pathogenic agents may be grown in almost limitless quantities and may be dispersed into the air as single cells. When this occurs accidentally, as in laboratories, a wholly artificial, man-made situation is created whereby such infectious particles may reach the alveoli of the lung. The purposeful creation of such clouds is biological warfare.

## Airborne Infection in Biological Warfare

Let us elaborate on how an enemy might use the airborne route of infection in biological warfare against man.

The frequency with which certain serious and even fatal infections occur among laboratory workers demonstrates that a large proportion of the adult population of this country is susceptible under such conditions of exposure. It further shows that at least some pathogenic agents remain virulent for man when grown under artificial conditions. The question, therefore, resolves itself to the simple proposition: Can

the enemy reproduce at will the conditions known to cause accidental laboratory epidemics?

It would seem that no new principles were involved. If grinding infectious tissue in a Waring Blendor will contaminate a room or if concentrating a suspension of pathogenic agents in a centrifuge will contaminate a whole building, such circumstances would be easy to reproduce. Furthermore, by utilizing atomizers or other disseminating devices far greater concentrations of infectious aerosols could be produced. Relatively simple equipment such as could be carried in an ordinary suitcase would be sufficient. Therefore, no theoretical reason precludes the possibility that an enemy saboteur could contaminate the air of any enclosed space where people congregate. An attack rate of disease as high or higher than that observed in explosive laboratory epidemics can be anticipated.

These same principles apply, only on a larger scale, to the use of aerosol clouds over cities. Specially designed bombs, shells, or other types of disseminating devices discharged from enemy aircraft or from warships offshore could create large clouds. Under appropriate but commonly recurring weather conditions, such clouds would remain close to the ground and, like pollen, diffuse with the wind over wide areas and for many miles, or, like smog, hang over a city for many hours.

The attack rate which might be expected from such an attack cannot be accurately predicted until practical demonstrations are made which will establish the concentrations of infective aerosols that can be attained. Theoretical calculations, however, indicate that with reasonably efficient disseminating devices relatively small amounts of material could establish very extensive clouds of high concentrations of agent. The problem would appear to be one of practical technical development rather than one requiring any new or undiscovered scientific principles. It would seem entirely possible that the incidence of casualties among those exposed to such a cloud attack might approach that which could be produced from the gross contamination of a building by sabotage.

## Epidemiology of Common Vehicle Epidemics

Our long familiarity and understanding of epidemics caused from contaminated water and food supplies makes it easy for us to comprehend how purposeful and malicious contamination could occur. Major epidemics have resulted from gross fecal contamination of water supplies. We had long and bitter experience with typhoid fever until our standards of purity and maintenance of safe water supplies were universally established. The epidemic of amebiasis in Chicago is merely another example with which we are wholly familiar.

The concentration of pathogenic agents in naturally polluted

waters is usually quite low compared to the wide variety of nonpathogenic flora normally present; nevertheless, serious epidemics have occurred. Therefore, the purposeful introduction of a relatively small volume of a highly concentrated suspension of essentially pure pathogenic agent could effectively contaminate a large part of a water distribution system. The principles of backsiphonage are so generally known that any plumber or person with minimum sanitary engineering training could introduce with ease such a pathogenic suspension at many points along a distribution system. The exact point of the introduction would be exceedingly difficult to locate or detect by epidemiological means. An incidence of casualties exceeding those known to occur in accidental waterborne epidemics can be expected because of the greater dosage of agent that can be attained.

Similarly, foodborne epidemics are well understood. These usually result from the contamination of certain types of warm or moist foods that provide an adequate culture medium for the pathogenic agent. While the size of the accidental inoculum may be small, the final concentration in the food actually ingested may be large because of opportunity for incubation and growth. Several foodborne epidemics of typhoid fever have involved a majority of the persons consuming the contaminated food, indicating that high concentrations overcome much of the natural resistance which the normal population may have. Therefore, a saboteur inoculating a high concentration of certain pathogenic agents in the appropriate food at the appropriate time could almost certainly produce epidemics with high attack rates among those who consumed it.

One's imagination is almost unlimited when one considers the wide variety of possibilities and potentialities of this form of warfare. The only limitations of consequence result from the accessibility of such food or water supplies to a subversive agent and the limited distribution of any single food or water supply.

It should be granted that such sabotage methods would not necessarily be limited to the use of biologically living agents. The toxins of *Clostidium botulinum* or other bacterial or vegetable toxins, or any of a wide variety of chemical poisons might similarly be utilized. Biological agents, however, have certain distinct advantages from a saboteur's point of view in that the extended incubation period going for a matter of many hours to days or even weeks would enable him to "do his business" and disappear, leaving few clues, whereas the more immediate effect of chemical poisons might make it more difficult for him.

## Conclusion

Therefore, the epidemiology of airborne infection and of common vehicle epidemics forms the basis for developing a theory of biological warfare. The evidence presented supports the conclusion stated in

the Manual (*1*) that biological warfare could be employed against us effectively. The planning of appropriate defensive measures must not be delayed.

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# Environmental Health: A Critique

By MARK D. HOLLIS*

This is a significant time to evaluate environmental health, for 1950 not only marks a midcentury point, but also it is the centennial anniversary of Lemuel Shattuck's epochal report on the sanitary survey of Massachusetts. If we are to blueprint the next half century of environmental health services, we must, therefore, exercise the same kind of foresight that characterized our 19th century "visionaries." At the same time, we must recognize that the blueprints must include safety factors appropriate to the stresses imposed by the turbulence of modern history.

Perhaps not more than a handful of us today would agree unanimously on the meaning of "environmental health." We might agree that the term covers health problems relating to man's need for and use of air, water, food, and shelter. But within such a sweeping generalization, there are innumerable specialized functions—and on these, opinions differ.

Health organizations long since have accepted as their primary responsibility the task of providing a safe and satisfying environment for mankind at work, at home, at play, and in all its varying cultural and economic settings. But the task of adjusting environmental health programs to the actual health and welfare needs, and economy, of the people served requires an orderly arrangement of health services through the assignment of priorities and full awareness of the cultural patterns in which the services are to operate.

That the environmental problems of the next 50 years will differ greatly from those of the last 50 can be seen in a review of the technological advances made during the past two decades. Some differences have been introduced also by political and economic changes attended by civil and international conflict.

Measurable progress has been influenced largely by the cataclysms of war and depression. Such dramatic currents of history, tragic as they are, nevertheless have stimulated the development of environmental health programs in the past. For example, the technique of species sanitation in malaria control was delineated during World War I. During World War II, species sanitation, combined with pinpoint

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epidemiology and assisted by newly perfected insecticides, opened the way to the eradication of malaria and other insect-borne diseases.

Another World War II development is the new surface filter, only now emerging as a laboratory aid, which may well alter our entire system of sanitary bacteriological controls. Again, the Federal work projects of the depression years provided some major improvements in rural and community sanitation throughout the Nation. These are but a few illustrations, yet one may well ask why these and other needs invariably seem to await national emergencies.

In providing basic sanitation services, nowhere have we historically placed greater emphasis than on the problems of the populous areas. Although our efforts to clean up gross insanitary conditions have yielded a high ratio of return per dollar expenditure, we have nevertheless concentrated on the city and paid insufficient attention to the small community and the rural area.

Environmental health services, for the most part, have been provided and financed in cities as a result of public demand and the response of local government to that demand. But many urban services are still deficient, and even these have not been extended to nonurban areas. Only a third of the rural farm population has running water in the home, but nearly two-thirds have electricity. Such a contrast raises an interesting question: Have we not failed to develop practical and economical rural sanitation facilities which could be installed and maintained as a public utility somewhat in the manner of the facilities installed and maintained by the rural electrification authorities? It goes without saying that the engineering and economic obstacles attending the installation of sewage lines are not comparable to those involved in stringing electrical facilities, but the analogy is there.

If the environmental health specialist would relate himself more actively to public needs and community affairs generally, as well as to specific public demands, he would find new and broader opportunities for service. By drawing on his professional background, he could contribute to the making of policy instead of merely adjusting himself to it after it has crystallized.

In comparison with world averages, progress in basic sanitation in the larger cities has kept pace reasonably well with national growth. The quality of public water supplies, the extent of sewerage services, and the suppression of disease-carrying insects, generally, are satisfactory. At least, the gross health hazards of these environmental factors by and large have been brought under control. To a lesser extent, existing knowledge has been applied to milk and food sanitation, control of stream pollution, and sanitation of metropolitan fringe areas. Similarly in need of improvement are sanitation services for schools and, as noted, for smaller communities and rural areas.


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These are areas in which, so far, we have not applied all the knowledge we possess. But, not even diagnosed as yet is the full health significance of radiological developments, substandard housing, excessive noise, refuse disposal problems, inadequate recreational facilities, and air pollution. Nor have health officials developed their potential role in reducing appalling home accident fatality rates. Of course, one of the greatest drawbacks to the development of environmental health activities today is the extreme paucity of trained personnel. These environmental health problems have been intensified by the economic strains engendered by emergency measures to build up national strength. High levels of health and vigor are needed, if not to resist possible injury by hostile forces, then at least to contribute as much as possible to American production.

We have made some notable advances toward the protection of our public water supplies. For example, typhoid fever incidence, once the standard gage of water's sanitary quality, has been practically eliminated. Other endemic physcial disorders in which water is known to be a contributory factor, however, have not yet received a corresponding degree of epidemiological attention. For example, a blood condition frequently fatal to infants is known to be related to a concentration of nitrates in well water, and studies are being made to determine the extent of this problem and develop methods of correcting it. There is also a medical question in the effect on cardiovascular patients of drinking water with a high sodium content.

Research on the relationships of fluorides in water to mottled enamel and dental caries has opened the field of fluoridation and defluoridation of public water supplies. Questions are arising, also, as to whether there are harmful physiological effects from industrial chemical wastes and perhaps from phosphates, the latter often added in water conditioning. And, too, the possible role of water in the transmission of virus diseases has been accepted as a hypothesis worth thorough study. Although the generally high quality of the Nation's public water supplies stands as a real achievement of the professional sanitary engineer, one must conclude that there is still a job to be done in this field.

Bound up with the problem of public water supply is the whole question of water pollution. Surface and underground waters are among the Nation's top natural resources, yet the seriousness of water pollution today, considering the speed with which it is increasing, is difficult to exaggerate. Each large new industrial development further complicates the pollution problem. Because water pollution is a by-product of increased industrial and urban development, continued national growth—both industrially and numerically—makes us increasingly dependent on our great water resources. Therefore, aggressive

action for proper remedial measures is mandatory. Water pollution control ranks with the topmost domestic needs of this country Failure to meet needs such as these today may make them prohibitively expensive to fulfill at some future date.

With the enactment of Public Law 845 in 1948, Congress for the first time acknowledged the Nation-wide character of water pollution problems. Past remedies for pollution have been applied piecemeal, in the form of "shotgun" therapy of local problems, as a rule, only because the situation was beyond esthetic tolerance. Until passage of the Water Pollution Control Act in 1948, except for a few cases, we had formulated no concept for developing and using the Nation's major watersheds to a point where each was capable of contributing its full benefits to the people. The development of such a concept involves the adjustment of all allied uses of water to the over-all public interest. Development and administration of the national antipollution program, therefore, will be a practical test of Federal, State, and interstate cooperation.

In general, the technology of sanitary control over milk and food is fairly well established; yet there is more confusion and lack of uniformity in public health administration of these basic services than is apparent in any other phase of environmental health. The multiplicity of codes, conflicting standards, and variations in interpretation are hard to explain. Moreover, they not only discourage public support, but they also contribute to inefficient service and high consumer costs. It is a wonder we in public health have been able to "get away with it" so long. These differences are producing chaos in the industries and confusing the manufacturers of sanitary equipment. In fact, the several industries concerned have appealed repeatedly, through their national organizations, for relief from multiple inspections and nonuniformity in health requirements.

The only apparent solution is one which divides itself into three phases: (1) adoption by States and communities of a uniform ordinance and code, sufficiently simple to minimize variations in application; (2) local administration of the general provisions by well-trained competent personnel; and (3) establishment of some central testing "facility" whose findings on sanitary equipment will be accepted nationally.

Pressure is mounting for some practical methods of controlling the sanitary quality of milk shipped in interstate traffic. The more than 13 million pounds of fluid milk shipped interstate daily from surplus to shortage areas serve to indicate the magnitude of the present need for some control measures. Techniques which have proved successful in the interstate shipment of shellfish might be considered for general application to this problem.

The time-temperature relationship involved in the death of the

Q fever rickettsia in milk is another problem yet to be solved. So is the use of synthetics in processing certain foods, a practice which has raised questions as to the nutritive value of foods so treated. This is a job calling for cooperative research in the fields of sanitation and human nutrition.

Dawes, the English authority who last year studied sanitary practices in this country, was surprised at our failure to regard refuse disposal as an essential environmental health service. The continuing prevalence of trichinosis and renewed interest in controlling flies and rodents are highlights in refuse disposal problems of the day.

Progress in the control of insect-borne diseases has been generally satisfactory. For example, the transmission of malaria virtually has been halted and endemic typhus fever is declining. However, control of the fly-borne infections, including gastroenteritis and equine encephalitis, have not been as satisfactory.

Because flies eventually develop resistance to DDT, its scientific rotation with other chemicals, such as chlordane and dieldrin, offers real promise. On the other hand, toxicity of many of our insecticides and rodenticides to man has not been too well defined.

Sanitation in public institutions has been disregarded for so long that few of us today have a clear picture of the situation in many of these places. The overcrowding that generally exists today in public institutions demands every practical safeguard, yet because institutional sanitation is not especially complicated, only simple and economical techniques are needed. This problem offers a challenge to State and local sanitarians.

Over the past three decades, gratifying progress has been made in the industrial hygiene field. Technical knowledge has kept pace fairly well with industrial developments. At the same time, the industrial hygiene concept has expanded from the rigid control of specified occupational diseases to the broader approach which embraces the workers' total health needs. The 2-year experiment started in May to develop a sound national plan for uniform reporting of occupational diseases is an example of the expanding scope of this field. Ten States in the eastern half of the country have agreed to conduct pilot programs of this type, using standard recording forms supplied by the Public Health Service.

Air pollution, especially in the heavily industrialized areas, is also attracting national attention. The Donora incident of 1948 has served to dramatize the importance of controls in this field. If they are to be developed, close cooperation between a variety of agencies, industry, and the public will be necessary.

The relationship between housing and health has long been recognized by public health authorities. The problem so far has been to develop knowledge of this relationship into a program designed to

improve both housing and health. It is ironic that we have expended greater effort to improve our industrial environment than our individual home environment. As a consequence, more than 10,000,000 American families live in substandard housing. This problem, therefore, cannot be ignored any longer. Health officials at all governmental levels can take the first step toward improving housing standards by working with official agencies and voluntary groups in the housing field. The new regulations recently adopted by the Massachusetts Department of Public Health to establish minimum health standards for human habitations represent a step in the right direction.

Home accidents continue to attract attention by their prominence among the leading causes of death and injury. Accidents, exclusive of motor vehicle, ranked as the fifth leading cause of death in 1948. Home accidents accounted for the major portion of these deaths.

Home accident prevention is logically a public health function. Health agencies have the epidemiological experience, engineering talent, nursing services, statistical skill, and educational facilities needed. The 3-year old Home Accident Demonstration Project being conducted by the City-County Health Department at Kalamazoo, Mich., offers alert health agencies a potential source of realistic control techniques.

The impact of the atomic age on health is yet to be fully evaluated. Man's unleashing of atomic energy has not only made possible great advances in science and industry but also has confronted him with new and potentially serious health problems. Eventually, the responsibility for protecting the population against harmful effects of ionizing radiation will fall upon public health officials.

Radioactive isotopes, for example, are being used on an increasingly wide scale in industry and medicine. Today, shipments are reaching institutions in almost every State at a rate of about 6,000 a year. Thus, where the care and handling of radioactive materials once was the province of a few trained experts, today the growing number of persons involved in handling the materials presents a potential public health problem, one which should be recognized and anticipated by alert health departments.

The public health profession also must fully respect the security controls imposed by the Atomic Energy Commission. At the same time, we must prepare immediately to meet our responsibility for health protection against radiological hazards. The Public Health Service is proceeding with all possible speed in this direction to carry out a four-point program, the objectives of which are: (1) to train a group of its officers as experts in the field of radiological health; (2) to furnish State health agencies with pertinent information as it becomes available through security channels, and to provide them with

consultation on emergency problems; (3) to develop at the Environmental Health Center (Cincinnati, Ohio) a training facility for selected State and local health personnel; and (4) in collaboration with the Atomic Energy Commission to carry out essential research.

Three major problems already are under study in the research phase of this program: (1) the development of practical methods of handling and disposing of radioactive wastes; (2) the development of techniques of detection and decontamination for affected public water supplies; and (3) the accumulation of data on the behavior and effect of radioactive waste in surface streams.

As environmental health horizons expand, adjustments will be needed in State health organizations. Already a few States have established bureaus of environmental health within their respective health departments. Yet, if environmental health services are to be interpreted so as to win public support, attention must be given not only to organizational realignment within public health agencies but also to the establishment and maintenance of effective liaison with professional and responsible voluntary agencies working in this field. The expansion of public health medical programs within the last decade indicates the value of this kind of teamwork.

The need for public health officials at all levels to play their rightful role in the planning of all public programs affecting health cannot be underscored too emphatically. It involves effective coordination between the public health agency and those whose activities impinge upon health. In some areas, however, it will require enterprising leadership to bring about recognition of the health implications of many activities outside the official health agency.

If environmental health programs are to recruit their fair share of trained personnel, an effective plan for recruitment must be adopted. In the past few years, the Public Health Service has made some progress in this respect by approaching the universities with a view to interesting promising students in a public health career.

In view of the international uncertainties, a discussion of environmental health would be incomplete without some mention of our responsibilities to national security. The modern potential of armed conflict and the sinister war tools known to exist dramatize the need for related public health control measures in a manner unimagined a decade ago. Civilian defense planning today calls for complete and faithful cooperation from health agencies at all governmental levels. And a fair portion of such cooperation includes a searching evaluation of the environmental factors involved. Difficult though it is to rate any one environmental factor above another, certain basic essentials always come high on the list.

Control of water pollution, though not immediately related to a threat of water borne epidemics, is urgent to assure an adequate

supply of useful water for industries and their workers in certain drainage basins. Pollution controls will serve also as an additional safeguard against water borne diseases, whether they are carried by microorganisms, chemicals, or radioactivity.

The importance of food in civilian defense is well understood in England which succeeded in raising the general level of nutrition during the last war despite shortages and deprivations, and despite recourse to rationing and community kitchens. Apart from nutrition problems, our chief dietary concern in this country is to avert infection or poisoning in restaurants, dairies, dining cars, and other places handling large amounts of milk and other foods. The migration of defense workers to milk shortage areas accentuates the need to protect the quality of milk shipped interstate. Oklahoma and Texas now permit the sale of market milk only if the producing State certifies that it was handled in conformance with the Public Health Service Standard Milk Ordinance and spot-checked by the Public Health Service. South Carolina requires certification of out-of-State milk by the Public Health Service.

Shifts in population, aggravated by emergency demands, also encourage housing practices which, if not directly dangerous, certainly impair the morale and efficiency of the occupants. Health departments have the responsibility to see that such abuses are corrected. Particularly in defense areas, they can anticipate the value of correcting substandard housing conditions.

Atmospheric problems include both the contamination of the general atmosphere and the special atmospheric conditions which affect the health of industrial workers. The death of 18 copper smelter employees from arsine poisoning may not seem significant numerically, but the strategic effect in the industry, and upon employees in the industry, is of major dimensions. It is important to protect the health of workers in strategic industries not only by control of atmospheric conditions but also by providing general in-plant health services.

The problem of protecting the health of the civilian population against the use of special weapons is at this stage occupied chiefly with research into the possible forms and channels of such weapons, their detection, and protective and remedial measures. Unquestionably, health officials have much to contribute to the organization of forces and methods to cope with possible attacks.

One other form of defense for the Nation is to help overcome the human distress, the suffering and misery that so often encourage discontent at home and aggression abroad. On the international scale, this task is in the hands of the World Health Organization.

The program of the World Health Organization features environmental sanitation as one of its six priority activities. Here again

success in developing environmental health services will depend on maintaining a balance between the order of health service priorities and the economic and development levels of the areas to be served. A good example of what can be done has been demonstrated in Latin America by the Health and Sanitation Division of the Institute of Inter-American Affairs.

Among the many factors that will influence the development of environmental health services, at least three are worthy of special mention:

1. The boldness with which we redefine and reestablish functions at the Federal, State, and local levels. There is a serious doubt that, as presently administered, the most effective use is being made of our available funds and manpower. Direct application of environmental health techniques is primarily the job of State and local health authorities, a fact which reemphasizes the need to strengthen our local health structures. The Federal health arm is more profitably employed in fields of research, planning, expert consultation, and as a central secretariat for establishing standards and developing and demonstrating control techniques. In other words, the Federal job as we see it, exclusive of our statutory obligations, is to carry out those functions that go beyond the resources and facilities of the individual States.

2. The competence we display in formulating our respective environmental health programs to meet the economic and social needs of the Nation. As we all know, the public health profession, as a whole, is shifting emphasis from epidemic diseases to the diseases of the aging population—the so-called chronic diseases. In environmental health, there is an overwhelming need to broaden operations to include problems of the physical environment that go beyond the control of specific germ diseases. True, existing programs remain extremely important, but we must not fail to recognize and explore the newer fields of public service.

3. The question of professional leadership. Since environmental health embraces such a wide range of health functions, it should be evident that the field belongs exclusively to no single profession. It is an interdisciplinary job. It requires a synthesis of skills through teamwork and includes recognition of the personal as well as the professional qualifications of the individual. The orderly development of public health programs, therefore, allows no professional isolationism. For example, teamwork approach involving a variety of professional disciplines has contributed to the success of industrial hygiene programs and malaria control. In the Public Health Service, this interdisciplinary approach will also characterize our water pollution control, radiological health, and hygiene of housing activities.

As the public health family matures, its leaders will be selected

more and more on the basis of such qualities as leadership and vision than on the basis of specific profession. The day is passing when any discipline can expect to control a major segment of the public health movement in any way other than by dynamic leadership and demonstrated professional competence. Speaking as a professional sanitary engineer, I would say that most of us are willing to accept this challenge with full confidence in our ability to continue playing a prominent role.

There are absorbing and productive developments in the environmental health picture of the future, but we must not lose sight of present responsibilities by chasing too ardently the rainbow of things to come. Nonetheless, there is a pressing need among environmental health leaders to bring research and program planning in their field up to a level commensurate with the needs of the people in our changing contemporary environment. Whether we shall achieve a desirable balance in our public health programs depends largely upon our own foresight and our own boldness in planning. If we succeed in evolving a keen and valiant plan of our own, we may be confident of the sympathetic understanding and support of our professional colleagues and of the people we serve.

# Incidence of Disease

*No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring*

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## UNITED STATES

### Reports From States for Week Ended March 10, 1951

In collaboration with the Influenza Information Center, National Institutes of Health, the following report on influenza has been prepared.

The number of reported cases of influenza for the current week was 14,448 compared with 10,675 for the previous week and 15,921 for the same week last year.

The prevalence of respiratory disease in the Chicago area increased about the first of February but is now apparently declining, according to Dr. C. G. Loosli of the University of Chicago and Dr. Albert Milzer of the Michael Reese Hospital, collaborating laboratories of the Influenza Study Program. The severity of the illness varied but, in general, was relatively mild, lasting only 3 or 4 days. It was characterized by sudden onset, fever, headache, general aches and pains, and minimal respiratory symptoms. Nine of 30 throat washings collected by Dr. Loosli yielded influenza viruses which preliminary test indicates are influenza A-prime strain. Serological tests in these laboratories have shown a rise in antibody titer in a total of 12 of 26 paired specimens against FM–1 strain of influenza A-prime virus. Two paired serum specimens showed significant rises againt the type B Lee antigen.

Dr. Morris Pollard of the University of Texas, Galveston, reports that influenza A-prime virus has been isolated, and antibody rises against A-prime strains in paired sera were determined in cases of influenzalike disease occurring there recently. The outbreak now appears to be waning. Paired serum specimens from two patients from the University of Texas infirmary in Austin showed significant hemagglutination inhibition titer increases between February 25 and March 4. According to Dr. H. V. Irons, Texas State Department of Health, one showed a fourfold rise against the FM–1 strain and the other showed an eightfold rise against the PR–8 strain.

Dr. A. P. McKee, Director of the Regional Laboratory at the University of Iowa, reports that an increase in influenzalike disease was noted in Iowa City in the early part of February. The first case

to be diagnosed by serologic test had onset February 6. Since that time, a number of cases have occurred, and all have shown antibody rises against the FM–1 strain of influenza A-prime virus by hemagglutination inhibition.

A strain of influenza A-prime virus from throat washings collected February 15 from a patient in Stuyvesant Falls, N. Y., is reported by Dr. Irving Gordon, Director of the Regional Laboratory, New York State Health Department. This strain shows a closer relation to strains isolated last year than to the FM–1 strain.

The Department of Virus and Rickettsial Diseases, Army Medical Service Graduate School, reports isolation of influenza A-prime strain similar to the Cuppett strain from a patient in the Washington, D. C. area. Influenza A-prime strain also similar to the Cuppett strain has been isolated from throat washings sent from Fort Sam Houston, Tex.

The Preventive Medicine Division, Office of the Surgeon General of the Army, reports that of eight paired serum specimens from a military installation in Kentucky, three showed antibody rises against type A, three against both type A and type A-prime, and one against A-prime in the hemagglutination inhibition test. One of two paired serum samples from an Air Force base in Virginia showed a rise against influenza type A-prime virus.

Dr. W. R. Geidt, Washington State Department of Health, reports the serologic diagnosis of influenza A-prime in two cases in the Puget

*Comparative Data for Cases of Specified Reportable Diseases: United States*

[Numbers after diseases are International List numbers, 1948 revision]

| Disease | Total for week ended— | | 5-year median 1946–50 | Seasonal low week | Cumulative total since seasonal low week | | 5-year median 1945–46 through 1949–50 | Cumulative total for calendar year— | | 5-year median 1946–50 |
|---|---|---|---|---|---|---|---|---|---|---|
| | Mar. 10, 1951 | Mar. 11, 1950 | | | 1950–51 | 1949–50 | | 1951 | 1950 | |
| Anthrax (062) | ------ | 2 | ------- | (1) | (1) | (1) | (1) | 15 | 4 | 10 |
| Diphtheria (055) | 75 | 143 | 203 | 27th | 3,847 | 5,904 | 8,573 | 940 | 1,633 | 2,215 |
| Encephalitis, acute infectious (082) | 18 | 13 | 11 | (1) | (1) | (1) | (1) | 123 | 120 | 85 |
| Influenza (480–483) | 14,448 | 15,921 | 3,753 | 30th | 65,446 | 66,639 | 66,639 | 50,904 | 56,055 | 56,055 |
| Measles (085) | 19,211 | 9,497 | 20,408 | 35th | 150,157 | 83,212 | 148,553 | 121,456 | 64,062 | 122,429 |
| Meningitis, meningococcal (057.0) | 121 | 103 | 90 | 37th | 2,073 | 1,799 | 1,799 | 1,112 | 885 | 870 |
| Pneumonia (490–493) | 2,494 | 2,764 | ------- | (1) | (1) | (1) | (1) | 19,788 | 24,541 | ------- |
| Poliomyelitis, acute (080) | 67 | 86 | 40 | 11th | 33,370 | 42,532 | 25,376 | 1,151 | 1,058 | 579 |
| Rocky Mountain spotted fever (104) | 1 | 2 | 1 | (1) | (1) | (1) | (1) | 3 | 10 | 9 |
| Scarlet fever (050) [2] | 2,569 | 1,924 | 3,008 | 32d | 38,584 | 34,139 | 50,564 | 22,893 | 17,700 | 26,745 |
| Smallpox (084) | 1 | 1 | 8 | 35th | [3] 14 | 20 | 52 | [3] 6 | 12 | 31 |
| Tularemia (059) | 7 | 30 | 24 | (1) | (1) | (1) | (1) | 136 | 236 | 236 |
| Typhoid and paratyphoid fever (040, 041) [4] | 65 | 63 | 54 | 11th | 3,321 | 3,844 | 3,844 | 406 | 471 | 437 |
| Whooping cough (056) | 1,574 | 2,807 | 2,254 | 39th | 38,023 | 46,803 | 46,803 | 16,421 | 25,267 | 22,390 |

[1] Not computed. [2] Including cases reported as streptococcal sore throat.
[3] Deductions: Wisconsin, week ended February 17, 1 case; Nevada, week ended January 6, 1 case.
[4] Including cases reported as salmonellosis.

Sound area. High prevalence of upper respiratory illness has been general throughout the State for the past 2 months.

Dr. W. L. Halverson, California State Director of Public Health, reports that approximately 100 cases of clinical influenza among residents of the Veterans Administration Center in Los Angeles were reported on February 28. He reports no increase in mortality. Complement fixation tests are in process. Southern California continues to release information indicating a sharp increase in prevalence of acute respiratory influenzalike illness.

The World Health Organization at Geneva reports mild influenza to be widespread in Switzerland, Italy, Trieste, and Turkey with cases also being reported in Portugal and Canada. A new outbreak of the disease is reported in Japan. The disease appears to be type A-prime everywhere with some type B in Italy.

# Reported Cases of Selected Communicable Diseases: United States, Week Ended Mar. 10, 1951

[Numbers under diseases are International List numbers, 1948 revision]

| Area | Diphtheria (055) | Encephalitis, infectious (082) | Influenza (480–483) | Measles (085) | Meningitis, meningococcal (057.0) | Pneumonia (490–493) | Poliomyelitis (080) |
|---|---|---|---|---|---|---|---|
| **United States** | 75 | 18 | 14,448 | 19,211 | 121 | 2,494 | 67 |
| **New England** | 7 | ---------- | 3,276 | 593 | 6 | 199 | ---------- |
| Maine | ---------- | ---------- | 1,925 | 7 | 1 | 50 | ---------- |
| New Hampshire | ---------- | ---------- | 537 | 23 | 1 | 35 | ---------- |
| Vermont | ---------- | ---------- | 91 | 108 | ---------- | ---------- | ---------- |
| Massachusetts | 5 | ---------- | ---------- | 360 | 1 | ---------- | ---------- |
| Rhode Island | ---------- | ---------- | 50 | 3 | ---------- | 4 | ---------- |
| Connecticut | 2 | ---------- | 673 | 92 | 3 | 110 | ---------- |
| **Middle Atlantic** | 9 | 5 | 463 | 2,040 | 25 | 435 | 7 |
| New York | 5 | 4 | [1] 295 | 673 | 9 | 138 | 7 |
| New Jersey | ---------- | 1 | 168 | 488 | 4 | 129 | ---------- |
| Pennsylvania | 4 | ---------- | ---------- | 879 | 12 | 168 | ---------- |
| **East North Central** | 5 | 8 | 84 | 3,146 | 19 | 151 | 10 |
| Ohio | 2 | ---------- | ---------- | 746 | 5 | ---------- | ---------- |
| Indiana | 2 | ---------- | ---------- | 253 | ---------- | 3 | 2 |
| Illinois | 1 | 5 | 9 | 533 | 4 | 86 | 3 |
| Michigan | ---------- | 3 | 75 | 695 | 7 | 62 | 5 |
| Wisconsin | ---------- | ---------- | ---------- | 919 | 3 | ---------- | ---------- |
| **West North Central** | ---------- | 1 | 39 | 1,411 | 8 | 121 | 3 |
| Minnesota | ---------- | ---------- | 3 | 127 | 1 | 11 | ---------- |
| Iowa | ---------- | ---------- | ---------- | 30 | 1 | ---------- | ---------- |
| Missouri | ---------- | ---------- | 5 | 413 | 4 | 2 | ---------- |
| North Dakota | ---------- | ---------- | 27 | 107 | ---------- | 94 | ---------- |
| South Dakota | ---------- | 1 | ---------- | 42 | ---------- | ---------- | ---------- |
| Nebraska | ---------- | ---------- | ---------- | 14 | ---------- | ---------- | 3 |
| Kansas | ---------- | ---------- | 4 | 678 | 2 | 14 | ---------- |
| **South Atlantic** | 18 | ---------- | 2,874 | 1,264 | 14 | 269 | 10 |
| Delaware | ---------- | ---------- | 45 | 35 | ---------- | ---------- | ---------- |
| Maryland | ---------- | ---------- | 8 | 89 | 1 | 43 | ---------- |
| District of Columbia | ---------- | ---------- | 3 | 48 | ---------- | 11 | ---------- |
| Virginia | 1 | ---------- | 876 | 420 | 2 | 113 | ---------- |
| West Virginia | 2 | ---------- | 771 | 50 | 2 | 20 | ---------- |
| North Carolina | 6 | ---------- | ---------- | 97 | 5 | ---------- | 1 |
| South Carolina | 4 | ---------- | 318 | 34 | 1 | 39 | 2 |
| Georgia | 5 | ---------- | 853 | 433 | ---------- | 43 | 1 |
| Florida | ---------- | ---------- | ---------- | 58 | 3 | ---------- | 6 |
| **East South Central** | 7 | ---------- | 119 | 1,314 | 12 | 198 | 3 |
| Kentucky | 1 | ---------- | 8 | 1,046 | 5 | 37 | ---------- |
| Tennessee | 3 | ---------- | 57 | 74 | 3 | ---------- | 1 |
| Alabama | 2 | ---------- | ---------- | 71 | 3 | 106 | ---------- |
| Mississippi | 1 | ---------- | 54 | 123 | 1 | 55 | 2 |
| **West South Central** | 20 | 3 | 665 | 4,819 | 22 | 845 | 8 |
| Arkansas | 2 | ---------- | 414 | 812 | ---------- | 90 | ---------- |
| Louisiana | 5 | ---------- | 73 | 209 | 4 | 105 | 2 |
| Oklahoma | 3 | 1 | 178 | 361 | 1 | 55 | ---------- |
| Texas | 10 | 2 | ---------- | 3,437 | 17 | 595 | 6 |
| **Mountain** | 3 | ---------- | 2,431 | 1,928 | 2 | 145 | 5 |
| Montana | 1 | | 34 | 47 | 1 | ---------- | ---------- |
| Idaho | ---------- | ---------- | ---------- | 41 | ---------- | ---------- | 1 |
| Wyoming | ---------- | ---------- | 1 | 50 | ---------- | 9 | ---------- |
| Colorado | ---------- | ---------- | 54 | 959 | 1 | 21 | ---------- |
| New Mexico | 1 | ---------- | 10 | 36 | ---------- | 32 | ---------- |
| Arizona | 1 | ---------- | 2,049 | 695 | ---------- | 83 | 3 |
| Utah | ---------- | ---------- | 266 | 69 | ---------- | ---------- | 1 |
| Nevada | ---------- | ---------- | 17 | 31 | ---------- | ---------- | ---------- |
| **Pacific** | 6 | 1 | 4,497 | 2,696 | 13 | 131 | 21 |
| Washington | ---------- | ---------- | 2,115 | 402 | ---------- | 17 | 2 |
| Oregon | 3 | ---------- | 1,981 | 62 | 2 | 54 | 2 |
| California | 3 | 1 | 401 | 2,232 | 11 | 60 | 17 |
| Alaska | ---------- | ---------- | 103 | ---------- | ---------- | ---------- | ---------- |
| Hawaii | ---------- | ---------- | 11 | 1 | ---------- | 1 | 1 |

[1] New York City only.

## Reported Cases of Selected Communicable Diseases: United States, Week Ended Mar. 10, 1951—Continued

[Numbers under diseases are International List numbers 1948 revision]

| Area | Rocky Mountain spotted fever (104) | Scarlet fever (050) | Smallpox (084) | Tularemia (059) | Typhoid and paratyphoid fever [1] (040,041) | Whooping cough (056) | Rabies in animals |
|---|---|---|---|---|---|---|---|
| **United States** | 1 | 2,569 | 1 | 7 | 65 | 1,574 | 160 |
| **New England** | | 182 | | | 4 | 138 | |
| Maine | | 19 | | | | 23 | |
| New Hampshire | | [2] 7 | | | | 24 | |
| Vermont | | 1 | | | | 13 | |
| Massachusetts | | 127 | | | 4 | 49 | |
| Rhode Island | | 10 | | | | 20 | |
| Connecticut | | 18 | | | | 9 | |
| **Middle Atlantic** | | 428 | | | 33 | 215 | 23 |
| New York | | [2] 235 | | | 2 | 79 | 22 |
| New Jersey | | 82 | | | 1 | 75 | 1 |
| Pennsylvania | | 111 | | | 30 | 61 | |
| **East North Central** | | 766 | | | 1 | 249 | 17 |
| Ohio | | 244 | | | | 40 | 4 |
| Indiana | | 48 | | | | 8 | [3] 10 |
| Illinois | | 97 | | | 1 | 41 | 2 |
| Michigan | | 352 | | | | 78 | 1 |
| Wisconsin | | 25 | | | | 82 | |
| **West North Central** | | 139 | 1 | 1 | | 77 | 8 |
| Minnesota | | 43 | | | | 16 | 1 |
| Iowa | | 9 | | | | 5 | 7 |
| Missouri | | 32 | | | | 8 | |
| North Dakota | | 2 | | | | 1 | |
| South Dakota | | | | | | | |
| Nebraska | | 9 | 1 | | | | |
| Kansas | | 44 | | 1 | | 47 | |
| **South Atlantic** | | 242 | | 3 | 4 | 161 | 28 |
| Delaware | | 4 | | | | 2 | |
| Maryland | | 40 | | | | 8 | |
| District of Columbia | | 22 | | | | 6 | |
| Virginia | | 34 | | | | 30 | 1 |
| West Virginia | | 16 | | | | 28 | 12 |
| North Carolina | | 85 | | | | 41 | |
| South Carolina | | 6 | | | 1 | 15 | 12 |
| Georgia | | 16 | | 3 | 3 | 16 | 3 |
| Florida | | [2] 19 | | | | 15 | |
| **East South Central** | | 85 | | | 4 | 132 | 38 |
| Kentucky | | 30 | | | | 92 | 12 |
| Tennessee | | 49 | | | 3 | 27 | 13 |
| Alabama | | 4 | | | 1 | 6 | 13 |
| Mississippi | | 2 | | | | 7 | |
| **West South Central** | | 107 | | 2 | 11 | 377 | 36 |
| Arkansas | | 6 | | 1 | 1 | 44 | 1 |
| Louisiana | | 12 | | 1 | 4 | 4 | |
| Oklahoma | | 21 | | | | 46 | 6 |
| Texas | | 68 | | | 6 | 283 | 29 |
| **Mountain** | 1 | 236 | | 1 | 2 | 160 | |
| Montana | 1 | 5 | | | | 5 | |
| Idaho | | 79 | | 1 | | 5 | |
| Wyoming | | 1 | | | | 16 | |
| Colorado | | 18 | | | | 12 | |
| New Mexico | | 6 | | | 2 | 15 | |
| Arizona | | 11 | | | | 96 | |
| Utah | | [2] 116 | | | | 11 | |
| Nevada | | | | | | | |
| **Pacific** | | 384 | | | 6 | 65 | 10 |
| Washington | | 91 | | | 1 | 8 | 9 |
| Oregon | | 51 | | | | 1 | |
| California | | [2] 242 | | | 5 | 56 | 1 |
| **Alaska** | | | | | | | |
| **Hawaii** | | 4 | | | | 1 | |

[1] Including cases reported as salmonellosis.
[2] Including cases reported as streptococcal sore throat.
[3] Two weeks report.

# FOREIGN REPORTS

## CANADA

*Reported Cases of Certain Diseases—Week Ended Feb. 24, 1951*

| Disease | Total | Newfoundland | Prince Edward Island | Nova Scotia | New Brunswick | Quebec | Ontario | Manitoba | Saskatchewan | Alberta | British Columbia |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Brucellosis | 2 | | | | | 2 | | | | | |
| Chickenpox | 1,325 | | | 21 | | 275 | 629 | 33 | 25 | 109 | 233 |
| Diphtheria | 1 | | | | | | | 1 | | | |
| Encephalitis, infectious | 1 | | | | | | | | 1 | | |
| German measles | 397 | 2 | | 44 | | 23 | 226 | 8 | 20 | 26 | 48 |
| Influenza | 10,391 | 1,763 | | 3,695 | 973 | | 993 | 65 | 1,661 | | 1,241 |
| Measles | 2,287 | 3 | | 25 | | 266 | 1,796 | 70 | 22 | 49 | 56 |
| Meningitis, meningococcal | 5 | | | 1 | | | 2 | 2 | | | |
| Mumps | 1,301 | 3 | | 9 | 1 | 185 | 506 | 50 | 77 | 222 | 248 |
| Scarlet fever | 348 | 1 | | 1 | | 71 | 54 | 33 | 15 | 64 | 109 |
| Tuberculosis (all forms) | 194 | 10 | | 14 | 9 | 84 | 34 | 12 | 4 | 7 | 20 |
| Typhoid and paratyphoid fever | 8 | | | | | 3 | | | | 1 | 4 |
| Venereal diseases: | | | | | | | | | | | |
| Gonorrhea | 233 | 10 | | 6 | 6 | 62 | 34 | 21 | 12 | 29 | 53 |
| Syphilis | 80 | 4 | | 14 | | 24 | 16 | 8 | 2 | 5 | 7 |
| Primary | 2 | | | 1 | | | 1 | | | | |
| Secondary | 10 | | | 1 | | 3 | 4 | | 1 | | 1 |
| Other | 68 | 4 | | 12 | | 21 | 11 | 8 | 1 | 5 | 6 |
| Whooping cough | 159 | 1 | | 3 | 5 | 34 | 39 | 6 | 3 | 2 | 66 |

## WORLD DISTRIBUTION OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER

The following tables are not complete or final for the list of countries included or for the figures given. Since many of the figures are from weekly reports, the accumulated totals are for approximate dates.

### CHOLERA

(Cases)

| Place | January-December 1950 | January 1951 | February 1951—week ended— 3 | 10 | 17 | 24 |
|---|---|---|---|---|---|---|
| ASIA | | | | | | |
| Burma | 2,436 | [1] 361 | [1] 5 | [1] 4 | [1] 7 | [1] 5 |
| Akyab | 2 | 7 | | | | |
| Bassein | 16 | 64 | 2 | 4 | 5 | 3 |
| Kyaukpyu | 2 | | | | | |
| Maubin | 3 | | | | | |
| Moulmein | 1 | | | | | 1 |
| Pegu | 1 | | | | | |
| Rangoon | [2] 7 | 4 | 3 | | 2 | 1 |
| Toungoo | 8 | | | | | |
| India | 174,153 | 10,495 | [1] 121 | [1] 93 | [1] 126 | [1] 112 |
| Ahmedabad | 10 | | | | | |
| Allahabad | 3 | | | | | |
| Bombay | [2] 431 | | 1 | | | |
| Calcutta | 9,522 | 229 | 82 | 71 | 96 | 87 |
| Cawnpore | 1 | | | | | |
| Cocanada | 2 | | | | | |
| Cuddalore | 60 | 1 | | 1 | 1 | |
| Lucknow | 12 | | | | | |

See footnotes at end of table.

## CHOLERA—Continued

| Place | January-December 1950 | January 1951 | February 1951—week ended— 3 | 10 | 17 | 24 |
|---|---|---|---|---|---|---|
| **ASIA—continued** | | | | | | |
| India—Continued | | | | | | |
| Madras | 1,136 | 41 | 17 | 12 | 7 | 11 |
| Masulipatam | 47 | | | | | |
| Nagpur | [2] 90 | 56 | | | 2 | |
| Negapatam | [3] 145 | 44 | 7 | 4 | 10 | 3 |
| New Delhi | 125 | | | | | |
| Port Blair (Andaman Islands) | [3] 2 | | | | | |
| Tellicherry | 27 | | | | | |
| Tiruchirappali | 50 | 38 | 14 | 3 | 7 | 9 |
| Trichinopoly | 1 | | | | | |
| Tuticorin | 77 | 16 | | 2 | 3 | 2 |
| India (French): | | | | | | |
| Karikal | 505 | 1 | 8 | 3 | 12 | |
| Pondicherry | 814 | 9 | 9 | 17 | 36 | |
| India (Portuguese) | 17 | | | | | |
| Indochina: | | | | | | |
| Cambodia | 15 | | | | | 30 |
| Viet Nam | 15 | 1 | | | | 4 |
| Giadinh | 3 | | | | | |
| Haiphong | | | | | | 3 |
| Rachgia | 1 | | | | | |
| Saigon | 1 | | | | | |
| Soc Trang | | | | | | 1 |
| Pakistan | 29,992 | 2,147 | | [1] 2 | [1] 1 | |
| Chittagong | 187 | 1 | | | | |
| Dacca | 203 | 14 | | 2 | 1 | |

[1] Preliminary. [2] Includes imported cases. [3] Imported.

## PLAGUE

(Cases)

| Place | January-December 1950 | January 1951 | February 1951—week ended— 3 | 10 | 17 | 24 |
|---|---|---|---|---|---|---|
| **AFRICA** | | | | | | |
| Belgian Congo | 32 | 1 | | 1 | | |
| Costermansville Province | 16 | | | | | |
| Stanleyville Province | 16 | 1 | | 1 | | |
| Madagascar | 154 | 64 | | [1] 15 | | |
| Rhodesia, Northern | 2 | | | | | |
| Union of South Africa | 17 | | | | | |
| Cape Province | 3 | | | | | |
| Orange Free State | 11 | | | | | |
| Transvaal Province | 1 | | | | | |
| Johannesburg | 1 | | | | | |
| **ASIA** | | | | | | |
| Burma | 364 | 77 | | | | |
| Bassein | 1 | | | | | |
| Bhamo | [3] 4 | | | | | |
| Henzada | 15 | | | | | |
| Kyaiklat | 34 | | | | | |
| Minhla | 2 | | | | | |
| Moulmein | [3] 3 | | | | | |
| Myaungmya | 5 | | | | | |
| Myingyan | 2 | | | | | |
| Pegu | [3] 5 | | | | | |
| Prome | [3] 1 | | | | | |
| Pyapon | 3 | | | | | |
| Rangoon | [3] 8 | | | | | |
| Yenangyaung | 58 | | | | | |
| China: | | | | | | |
| Chekiang Province | 42 | | | | | |
| Wenchow | [4] 4 | | | | | |
| Fukien Province | 1,037 | | | | | |
| Amoy | 10 | | | | | |
| Kwangsi Province | [4] 63 | | | | | |
| Kwangtung Province | 634 | | | | | |
| India | 42,554 | [5] 935 | | | | |
| Allahabad | [3] 20 | [3] 4 | | | | |
| Bombay | [2] 5 | | | | | |
| Calcutta | [2] 3 | | | | | |
| Cawnpore | 18 | | | | | |
| Lucknow | [3] 10 | | | | | |

See footnotes at end of table.

## PLAGUE—Continued

| Place | January-December 1950 | January 1951 | February 1951-week ended— | | | |
|---|---|---|---|---|---|---|
| | | | 3 | 10 | 17 | 24 |
| ASIA—continued | | | | | | |
| Indochina: | | | | | | |
| Cambodia | [6] 46 | | | | | |
| Pnompenh | 3 | | | | | |
| Viet Nam | 136 | 10 | 1 | 3 | | 1 |
| Phanthiet | 96 | 5 | 1 | 2 | | 1 |
| Saigon | 1 | | | | | |
| Laos | 2 | | | | | |
| Indonesia: | | | | | | |
| Java | [7] 250 | [5] 3 | | [5] 1 | | |
| Bandoeng | 6 | | | | | |
| Djakarta | 3 | [3] 1 | | | | |
| Jogjakarta | 241 | 2 | | | | |
| Semarang | | | | [3] 1 | | |
| Pakistan | 1 | | | | | |
| Karachi | 1 | | | | | |
| Thailand | 58 | 7 | | | | |
| SOUTH AMERICA | | | | | | |
| Brazil | 53 | | | | | |
| Alagoas State | 19 | | | | | |
| Bahia State | 16 | | | | | |
| Ceara State | 2 | | | | | |
| Paraíba State | 5 | | | | | |
| Pernambuco State | 10 | | | | | |
| Sao Paulo State: Santos | 1 | | | | | |
| Ecuador | 27 | | | | | |
| Chimborazo Province | 4 | | | | | |
| El Oro Province | 4 | | | | | |
| Loja Province | 19 | | | | | |
| Peru | 28 | | | | | |
| Ancash Department | 3 | | | | | |
| Lambayeque Department | 2 | | | | | |
| Libertad Department | 1 | | | | | |
| Lima | 11 | | | | | |
| Piura Department | 11 | | | | | |
| Venezuela | 5 | | | | | |
| Miranda State | 5 | | | | | |

[1] Feb. 1–10, 1951. [2] Includes imported cases. [3] Imported. [4] Deaths. [5] Preliminary figure. [6] Includes suspected cases. [7] Corrected figure.

## SMALLPOX

(Cases)

| | | | | | | |
|---|---|---|---|---|---|---|
| AFRICA | | | | | | |
| Algeria | 146 | 2 | | [1] 4 | | |
| Angola | 371 | | | | | |
| Bechuanaland | 231 | | | | | |
| Belgian Congo | 4,960 | 159 | 41 | | | |
| British East Africa: | | | | | | |
| Kenya | 12 | | | | | |
| Nyasaland | 289 | 8 | 1 | 4 | | |
| Tanganyika | 4,744 | 31 | | | | |
| Uganda | 6 | | | | | |
| Cameroon (British) | 447 | | | | | |
| Cameroon (French) | 134 | 42 | | | [5] 22 | |
| Dahomey | 537 | 122 | | [1] 36 | [5] 21 | [5] 50 |
| Egypt | 9 | | | | | |
| Eritrea | 1 | | | | | |
| Ethiopia | 46 | | | | | |
| French Equatorial Africa | 459 | | | | [5] 7 | |
| French Guinea | 12 | | | [1] 1 | | |
| French West Africa: Haute Volta | 244 | 3 | | | | |
| Gambia | 7 | | | | | |
| Gold Coast | 442 | 120 | 36 | 67 | 20 | |
| Ivory Coast | 699 | 44 | | [1] 1 | [5] 2 | |
| Libya | 2 | | | | | |
| Mauritania | 1 | | | | | |
| Morocco (French) | 18 | 5 | | | | |
| Mozambique | 377 | 19 | | | | |
| Nigeria | 20,213 | 636 | | | | |
| Niger Territory | 1,272 | 82 | | [1] 34 | | |
| Rhodesia: | | | | | | |
| Northern | 5 | | | | | |
| Southern | 982 | | | | | |

See footnotes at end of table.

| Place | January-December 1950 | January 1951 | February 1951—week ended— 3 | 10 | 17 | 24 |
|---|---|---|---|---|---|---|
| AFRICA—continued | | | | | | |
| Senegal | 2 | | | | | |
| Sierra Leone | 38 | | | | | |
| Sudan (Anglo-Egyptian) | 83 | 11 | | 1 | | |
| Sudan (French) | 328 | 88 | | [1] 28 | | |
| Togo (French) | 127 | 16 | | | [2] 1 | |
| Tunisia | 2 | | | | | |
| Union of South Africa | 989 | | | | | |
| ASIA | | | | | | |
| Afghanistan | 612 | 52 | | | | |
| Arabia | 334 | | | | | |
| Bahrein Islands: Bahrein | 36 | | | | | |
| Kamaran Island: Kamaran | [4] 2 | | | | | |
| Burma | 5,121 | 59 | 14 | 11 | 38 | 64 |
| Ceylon | [5] 3 | | | | | |
| China | 788 | | | | | |
| India | 151,707 | 17,516 | 831 | 681 | 904 | 969 |
| India (French) | 787 | 42 | 91 | 67 | 177 | |
| India (Portuguese) | 102 | | | | | |
| Indochina: | | | | | | |
| Cambodia | 99 | 7 | 2 | 1 | | |
| Viet Nam | 269 | 10 | 6 | 4 | 4 | 7 |
| Indonesia: | | | | | | |
| Borneo | 1,495 | | | | | |
| Java | 7,977 | 51 | 1 | | 7 | [3] 7 |
| Sumatra | 348 | | | | | |
| Iran | 451 | 42 | 11 | 26 | 25 | |
| Iraq | 272 | 76 | 3 | 16 | 4 | |
| Israel | 17 | | | | | |
| Japan | 8 | | | | 7 | 8 |
| Korea (Republic of) | 1,331 | | | | | |
| Lebanon | [4] 2 | | | | | |
| Netherlands New Guinea | 3 | | | | | |
| Pakistan | 21,780 | 4,151 | 3 | 3 | 16 | |
| Palestine | 95 | | | | | |
| Straits Settlements: | | | | | | |
| Singapore | [5] 2 | | | | | |
| Syria | 16 | | | | | |
| Thailand | 460 | 20 | | | | |
| Transjordan | 35 | | | | | |
| Turkey. (*See* Turkey in Europe.) | | | | | | |
| EUROPE | | | | | | |
| Great Britain: | | | | | | |
| England: | | | | | | |
| Brighton | 15 | 15 | | | | |
| Liverpool | 1 | | | | | |
| Scotland: Glasgow | 21 | | | | | |
| Greece | 15 | | | | | |
| Portugal | 1 | | | | | |
| Sicily | 2 | | | | | |
| Spain: Canary Islands | 1 | | | | | |
| Turkey | 9 | | | | | |
| NORTH AMERICA | | | | | | |
| Guatemala | 10 | | | | | |
| Mexico | 495 | | | | | |
| SOUTH AMERICA | | | | | | |
| Argentina | 517 | | | | | |
| Brazil | 112 | | | | | |
| British Guiana | | 8 | | | | |
| Chile | 3,588 | | | | | |
| Colombia | 415 | | | | | |
| Ecuador | 257 | 11 | | | | |
| Paraguay | 15 | | | | | |
| Peru | 2,680 | | | | | |
| Uruguay | 1 | | | | | |
| Venezuela | 1,538 | | | | | |
| OCEANIA | | | | | | |
| Australia: Freemantle | 1 | | | | | |

[1] Feb. 1-10, 1951. [2] Feb. 11-20, 1951. [3] Feb. 21-28, 1951. [4] Imported. [5] Includes imported cases.

## TYPHUS FEVER *

(Cases)

| Place | January-December 1950 | January 1951 | February 1951—week ended— 3 | 10 | 17 | 24 |
|---|---|---|---|---|---|---|
| AFRICA | | | | | | |
| Algeria | 127 | 3 | - | - | - | - |
| Basutoland | 24 | - | - | - | - | - |
| Belgian Congo | [1] 90 | - | - | - | - | - |
| British East Africa: | | | | | | |
| Kenya | 23 | - | - | - | - | - |
| Mombasa | [3] 3 | - | - | - | - | - |
| Somaliland | - | 1 | - | - | - | - |
| Uganda | 2 | - | - | - | - | - |
| Egypt | 95 | 21 | 4 | 2 | 1 | 3 |
| Eritrea | 37 | 1 | - | - | - | - |
| Ethiopia | 1,255 | - | - | - | - | - |
| French Equatorial Africa | 5 | - | - | - | - | - |
| Gold Coast | 10 | - | - | - | - | - |
| Libya: | | | | | | |
| Cyrenaica | 27 | - | - | - | - | - |
| Tripolitania | 73 | 1 | - | - | - | - |
| Madagascar | 2 | - | - | - | - | - |
| Morocco (French) | 10 | 1 | - | - | - | - |
| Morocco (International Zone) | 2 | - | - | - | - | - |
| Morocco (Spanish Zone) | 6 | - | - | - | - | - |
| Mozambique | 3 | - | - | - | - | - |
| Nigeria | 1 | - | - | - | - | - |
| Rhodesia, Southern | [1] 7 | - | - | - | - | - |
| Sierra Leone | [2] 5 | - | - | - | - | - |
| Sudan (Anglo-Egyptian) | 5 | - | - | - | - | - |
| Tunisia | 63 | - | - | - | - | - |
| Union of South Africa | 115 | - | - | - | - | - |
| ASIA | | | | | | |
| Afghanistan | 1,331 | 71 | - | - | - | - |
| Burma | [1] 15 | - | - | - | - | - |
| Ceylon | 4 | - | - | - | - | - |
| China | [1] 20 | - | - | - | - | - |
| India | 363 | [3] 8 | - | 3 | - | - |
| India (Portuguese) | 90 | - | - | - | - | - |
| Indochina: Viet Nam | 35 | 2 | - | - | - | - |
| Indonesia: | | | | | | |
| Java | 6 | - | - | - | - | - |
| Sumatra | 1 | - | - | - | - | - |
| Iran | 220 | 15 | 8 | 3 | 4 | 5 |
| Iraq | 137 | 2 | 1 | - | 1 | 1 |
| Japan | 931 | - | - | - | - | - |
| Korea (Republic of) | [2] 1,161 | - | - | - | - | - |
| Lebanon | [1] 2 | - | - | - | - | - |
| Netherlands New Guinea | 2 | - | - | - | - | - |
| Pakistan | 103 | 5 | - | - | - | - |
| Palestine | 7 | - | - | - | - | - |
| Straits Settlements: Singapore | [1] 8 | - | - | - | - | - |
| Syria | [1] 39 | - | - | - | - | - |
| Transjordan | 29 | 1 | - | - | - | - |
| Turkey (see Turkey in Europe). | | | | | | |
| EUROPE | | | | | | |
| France | 1 | - | - | - | - | - |
| Germany (British Zone) | [1] 2 | - | - | - | - | - |
| Germany (French Zone) | 2 | - | - | - | - | - |
| Germany (United States Zone) | 3 | - | - | - | - | - |
| Great Britain: | | | | | | |
| England: Liverpool | [3, 4] 1 | - | - | - | - | - |
| Island of Malta [1] | 41 | - | - | - | - | - |
| Greece | 28 | - | - | - | - | - |
| Hungary | 4 | - | - | - | - | - |
| Italy | 53 | - | - | - | - | - |
| Sicily | 41 | - | - | - | - | - |
| Poland | 37 | - | - | - | - | - |
| Portugal | 5 | - | - | - | - | - |
| Spain | 48 | - | - | - | - | - |
| Turkey | 227 | - | - | - | - | - |
| Yugoslavia | 264 | - | - | - | - | - |
| NORTH AMERICA | | | | | | |
| Costa Rica [1] | 17 | - | - | - | - | - |
| Guatemala | 33 | - | - | - | - | - |
| Jamaica [1] | 34 | [3] 1 | - | - | - | - |
| Mexico [1] | 362 | - | - | - | - | - |
| Panama Canal Zone [1] | 6 | - | - | - | - | - |
| Puerto Rico [1] | 26 | - | - | - | - | - |
| Virgin Islands | 1 | - | - | - | - | - |

See footnotes at end of table.

## TYPHUS FEVER—Continued

| Place | January–December 1950 | January 1951 | February 1951—week ended— 3 | 10 | 17 | 24 |
|---|---|---|---|---|---|---|
| **SOUTH AMERICA** | | | | | | |
| Argentina | 2 | | | | | |
| Chile | 143 | | | | | |
| Colombia | 515 | | | | | |
| Curacao | 3 | | | | | |
| Ecuador | 370 | | | | | |
| Peru | 1,089 | | | | | |
| Venezuela | 133 | | | [2] 1 | | [2] 1 |
| **OCEANIA** | | | | | | |
| Australia [1] | 105 | | | | | |
| Hawaii Territory [1] | 8 | | | | | |

* Reports from some areas are probably murine type, while others include both marine and louse-borne types.

[1] Includes murine type. [2] Murine. [3] Includes suspected cases. [4] Imported.

## YELLOW FEVER

(C—cases; D—deaths)

| Place | | January–December 1950 | January 1951 | February 1951—week ended— 3 | 10 | 17 | 24 |
|---|---|---|---|---|---|---|---|
| **AFRICA** | | | | | | | |
| Belgian Congo | C | 3 | | | | | |
| Stanleyville Province | C | 3 | | | | | |
| French Equatorial Africa | C | [1] 1 | | | | | |
| Port Gentil | C | [1] 1 | | | | | |
| Gold Coast | C | 18 | [1] 1 | | | | |
| Accra | D | [3] 4 | | | | | |
| Ankobra Ferry | D | 1 | | | | | |
| Bogoso | C | [3] 2 | | | | | |
| Kade | C | 1 | | | | | |
| Oda Area: | | | | | | | |
| Akwatia | C | [3] 8 | | | | | |
| Atiankama | C | 1 | | | | | |
| Bawdua | D | 1 | [1] 1 | | | | |
| Taquah Aboso | D | [3] 1 | | | | | |
| Nigeria | D | [3] 2 | | | | | |
| Calabar | D | [3] 1 | | | | | |
| Ibadan | D | [1] 1 | | | | | |
| Sierra Leone | C | [1] 2 | | | [1 3] 1 | | |
| Koinadugu District | C | [3] 2 | | | | | |
| Freetown | C | | | | [1 3] 1 | | |
| **NORTH AMERICA** | | | | | | | |
| Panama: | | | | | | | |
| Colon | D | 1 | | | | | |
| **SOUTH AMERICA** | | | | | | | |
| Bolivia | C | 867 | | | | | |
| Chuquisaca Department | C | [4] 850 | | | | | |
| La Paz Department | C | [5] 17 | | | | | |
| Brazil | D | 22 | | | | | |
| Bahia State | D | 1 | | | | | |
| Ipiau | D | 1 | | | | | |
| Goiaz State | D | [5] 20 | [6] 2,000 | | | | |
| Uruacu | D | [5] 20 | | | | | |
| Maranhao State | D | 1 | | | | | |
| Colins | D | 1 | | | | | |
| Matto Grosso State | D | | 1 | | | | |
| Colombia | D | 10 | 11 | | | | |
| Boyaca Department | D | 1 | 1 | | | | |
| Chizu | D | 1 | | | | | |
| Otanche | D | | 1 | | | | |
| Caqueta Commissary | D | | 1 | | | | |
| Magdalena Department | D | 1 | | | | | |
| Los Angeles, Rio de Oro | D | 1 | | | | | |
| Meta Territory | D | 2 | | | | | |
| Puerto Lopez | D | 2 | | | | | |
| North Santander Department | D | 1 | 4 | | | | |
| La Vega | D | | 3 | | | | |
| Ocana | D | 1 | | | | | |
| Rionegro | C | | 1 | | | | |
| Putumayo Commissary | D | 3 | | | | | |
| Mocoa Locality | D | 3 | | | | | |
| Santander Department | D | 2 | 5 | | | | |
| Campohermoso | D | | 1 | | | | |
| Cuesta Rica | D | 1 | | | | | |

See footnotes at end of table.

| Place | | January-December 1950 | January 1951 | February 1951-week ended— | | | |
|---|---|---|---|---|---|---|---|
| | | | | 3 | 10 | 17 | 24 |
| SOUTH AMERICA—continued | | | | | | | |
| Colombia—Continued | | | | | | | |
| Santander Department—Continued | | | | | | | |
| Guamales | D | | 1 | | | | |
| Landazuri | D | 1 | | | | | |
| Maradales | D | | 1 | | | | |
| Tambo Redondo | D | | 1 | | | | |
| Veneoas | D | | 1 | | | | |
| Peru | D | 14 | | | | | |
| Cuzco Department | D | 2 | | | | | |
| Quincemil | D | 2 | | | | | |
| Huanuco Department | D | 6 | | | | | |
| Tingo Maria | D | 6 | | | | | |
| Junin Department | D | 1 | | | | | |
| San Ramon | D | 1 | | | | | |
| Loredo Department | D | 1 | | | | | |
| Pucalpa | D | 1 | | | | | |
| San Martin Department | D | 4 | | | | | |
| Belavista | D | 1 | | | | | |
| Juanjui | D | 1 | | | | | |
| Lamas | D | 1 | | | | | |
| Tarapoto | D | 1 | | | | | |
| Venezuela | D | 3 | | | | | |
| Bolivar State | D | 2 | | | | | |
| Argelia | D | 1 | | | | | |
| La Parida | D | 1 | | | | | |
| Tachira State | D | 1 | | | | | |
| El Milagro | D | 1 | | | | | |

[1] Suspected. [2] Includes suspected cases. [3] Imported. [4] Estimated number of cases reported in an outbreak in Asero Province, Jan. 1-Mar 14, 1950. [5] Outbreak in North and South Youngas Provinces. [6] The number of deaths from Dec. 1-Jan. 20 was estimated to be 20. An estimate of 2,000 cases covers the period Dec. 1-Feb. 20.

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# Public Health Reports

VOLUME 66 **APRIL 6, 1951** NUMBER 14

TUBERCULOSIS CONTROL ISSUE NO. 62

**IN THIS ISSUE**

Community-Wide Chest X-ray Survey, IV

BCG Vaccination in Czechoslovakia

FEDERAL SECURITY AGENCY

PUBLIC HEALTH SERVICE

**FEDERAL SECURITY AGENCY**
***Oscar R. Ewing, Administrator***

**PUBLIC HEALTH SERVICE**
***Leonard A. Scheele, Surgeon General***

**Division of Public Health Methods**
***G. St. J. Perrott, Chief of Division***

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This is the sixty-second of a series of special issues of PUBLIC HEALTH REPORTS devoted exclusively to tuberculosis control. The special issues began March 1, 1946, and appear the first week of each month. The articles are reprinted as extracts. Effective with the July 5, 1946, issue, these extracts may be purchased from the Superintendent of Documents, Government Printing Office, Washington 25, D. C., for 10 cents a single copy. Subscriptions are obtainable at $1.00 per year; $1.25 foreign.

# Public Health Reports

*Vol. 66* • APRIL 6, 1951 • *No. 14*

## Community-Wide Chest X-ray Survey
## IV. Diagnostic Clinic

By DAVID REISNER, M. D., and ARTHUR RIKLI, M. D.,*

EDITOR'S NOTE. Since tuberculosis is first a medical problem, any organized procedure aimed at finding the disease is essentially a medical program. Consequently, all physicians—whether they be in private practice or in public health, or whether they be general practitioners or specialists—invariably have primary responsibility for the conduct of such a program. In a community-wide chest X-ray survey, there are many activities which engage the interest and attention of physicians. These include the entire range of medical activities which enter into this kind of enterprise: over-all planning, including the development of medical policies and procedures to govern the survey—policies and procedures, for example, on film interpretation, diagnosis, follow-up, and disposition—and the development of working relationships among local medical societies, departments of health, and voluntary health agencies; taking and interpreting the screening films and the conventional 14″ x 17″ roentgenograms; diagnostic work-up and differentiation of abnormalities revealed by the chest films; disposition of the cases of significant disease found in the chest survey; and finally, long-term follow-up. In addition, the medical profession of the community has over all responsibility for administration, and for exploiting opportunities for professional information and education which a survey provides in abundance.

In the Denver chest X-ray survey, which was conducted in 1949, the physicians of that community chose the device of a diagnostic center to accomplish the diagnosis and disposition of suspects discovered during the course of the screening program. The center represented one of the principal areas of medical participation in the survey. Because of special interest in this device, we are, this month, presenting a detailed account of the organization and operation of that center.

In any community-wide chest X-ray survey, the small-film radiographic examination is but the first step in the case-finding process. It is, indeed, merely a screening operation, serving to separate persons with definitely or suspiciously abnormal X-ray shadows from those with no suggestion of chest abnormality.

*Director (until Dec. 1, 1950), and Assistant Director, respectively, Division of Tuberculosis Control, Bureau of Health and Hospitals, City and County of Denver; and Tuberculosis Consultants, Public Health Service.

X-ray film cannot by itself constitute a clinical diagnosis. Nevertheless, it does serve to focus attention on those persons in need of further study. At the same time, such a photofluorographic finding imposes an obligation on the physician and the official health agency—an obligation to carry out full diagnostic study promptly in order to determine the clinical significance of the suspected abnormality. For, the abnormal findings discernible in an initial screening film can range all the way from minor deviations requiring no follow-up or care to some very serious conditions which demand immediate medical attention.

It is entirely unrealistic to expect all or even a majority of persons who have been notified of suspicious X-ray shadows to follow through themselves on the elaboration of these findings. Often, a patient may delay or even neglect seeking necessary medical advice, especially when he has no apparent symptoms. Since most of the significant screening-film abnormalities are found among persons without apparent symptoms, the implications of failure to follow-up the suspicious X-ray findings are only too evident. Prompt clinical evaluation is vital, both from the public health and personal points of view.

There is no doubt, moreover, that the cautious interpretation of screening films does result in some over-reading and in the misclassification of some persons as "suspects." In actual fact, many of these cases will be removed from the "suspect" category and relieved of needless anxiety on the basis of a 14″ x 17″ X-ray film alone. Others will require more extensive diagnostic work-up to clarify the significance of the suspicious finding observed in the screening film. In any case, prompt diagnostic evaluation is of the greatest importance, whether the "suspect" proves to be negative or whether he is actually found to have significant disease.

From the standpoint of the private physician, diagnostic studies carried out as part of a chest X-ray survey offer the great advantage of providing a certain amount of concrete information concerning his patient's condition, rather than an ill-defined suspicion of an abnormality noted on the screening film. In many instances, the physician might otherwise find it difficult and time-consuming to obtain the necessary diagnostic studies himself. Not infrequently, the patient may be unwilling or unable to follow the physician's advice concerning further diagnostic work-up because of financial considerations. All this is likely to result in loss of valuable time, to the patient's detriment.

For the official health agency, the matter of speedy diagnostic evaluation is of particular urgency. The community agency is most directly and profoundly affected by a chest X-ray screening program because of the number of new cases of tuberculosis discovered by the survey. If the resources of the health department are to be used

most profitably, tuberculosis case registers must not be overloaded with large numbers of "suspects" whose follow-up will produce findings of little or no public health significance. Here again, there can be no substitute for prompt and full diagnostic study.

Finally, the community aspect of the problem deserves particular consideration, since the discovery of the active and infectious case of tuberculosis is one of the chief objectives of the survey program. The prompt and accurate identification of these cases through adequate diagnostic study is the first step in providing isolation and care, and, thus, in removing the potential foci of infection. Since hospital facilities—the means for the accomplishment of this objective—are quite often limited, discrimination and clinical judgment must be exercised to determine priorities for institutional treatment; without full clinical, radiological, and bacteriological information on which to base such determinations, the best interests of the community's health and its protection against tuberculous infection cannot properly be served.

In the Denver and Tri-County Chest X-ray Survey of 1949, these were the considerations which motivated the establishment of a special diagnostic clinic as an integral part of the survey organization. To those responsible for the formulation of basic medical policies and procedures, a properly organized and adequately staffed and equipped diagnostic center seemed to offer the best assurance of attaining the survey's stated objectives: the discovery of all cases of tuberculosis within the surveyed communities. Accordingly, at the recommendation of the survey's medical committee and with the approval of the county medical societies, a diagnostic center was set up as part of the program's organization. The center, however, was kept separate and apart from existing public health clinic facilities.

## Organization of the Center

It was apparent that there were no ready facilities in existence in the community to meet the anticipated needs. It was clear that the case load which could be expected to result from a survey of these proportions would be so great that it would require an unusual concentration of effort for a limited period of time. It was therefore necessary to set in motion an improvised organization with the aid of available resources in the community; to recruit an ad hoc staff, including medical, nursing, and other auxiliary personnel; and to provide other facilities and equipment essential for efficient operation.

The diagnostic center was set up as one of the units of the survey organization, and its operation closely integrated with the promotional, community participation, technical, and professional activities of the survey. Both professional and volunteer members of the survey

staff were fully informed of the basic aims and functions of the diagnostic center so that they in turn could interpret them to the public.

A close working relationship was set up between the staff of the diagnostic center and the survey team. Public Health Service medical officers assigned to the survey team engaged in periodic conferences with the center's medical staff to discuss policies and practices and to review the 14″ x 17″ films of persons recalled for further study. This was of considerable value in providing some continuity in the diagnostic evaluation and disposition of the cases.

### *Quarters and Equipment*

The diagnostic center was housed in the former communicable disease unit of Denver General Hospital, which was made available by the Denver Bureau of Health and Hospitals. It adjoined the general headquarters and record center of the survey organization and was conveniently located from the standpoint of transportation and general accessibility. Only minor alterations of the building were required to make it suitable for the purposes of the center.

Equipment for the center was obtained from a variety of sources. The radiographic unit and darkroom equipment for 14″ x 17″ films were provided by the Public Health Service. A fluoroscopic unit, X-ray film illuminators, and other equipment, as well as office furniture, were obtained on loan from a number of the sponsoring agencies, other community organizations, and commercial establishments.

### *Personnel*

Recruitment of professional personnel was one of the major problems in the organization of the diagnostic center. Because of the large case load expected, and the need for rapid disposition of all cases, it was necessary to call upon community resources to assist in providing the required personnel.

*Medical Staff.* From a panel prepared by the county medical societies, the medical committee selected 20 practicing physicians on the basis of their special training and experience in tuberculosis and diseases of the chest. Each served on a part-time basis and received a modest honorarium for his services. The schedule was arranged in such a way that medical staff services were available at all times, with the size of the staff at a given time depending on the expected case load.

The Director of the Division of Tuberculosis Control of the Denver Bureau of Health and Hospitals was designated as medical director of the diagnostic center. In this capacity, he was responsible for the general direction of the diagnostic center and for carrying out the basic policies of the program as set up by the medical committee and approved by the county medical societies. Direct management of the center was made the responsibility of a full-time assistant director;

for this post, the regional office of the Public Health Service contributed the full-time services of its tuberculosis consultant for the entire period of the center's operation.

Essentially, the functions of the physician serving in the diagnostic center included the following:

1. To make a clinical evaluation of the case on the basis of the assembled data, such as clinical history, radiographic findings, and laboratory reports;
2. To establish either a definitive or a presumptive diagnosis;
3. To acquaint the patient with the nature of his condition and to explain the need for further medical care and follow-up, when indicated;
4. To initiate referral and to transmit a summary of the findings to the private physician or agency to which the patient was referred for follow-up.

It should be noted that the active participation of the relatively large number of practicing physicians who comprised the center's medical staff was of distinct value from the community point of view. By providing a link between the survey organization and the medical profession at large, these physicians served to sharpen professional interest not only in the survey activity but in the whole tuberculosis control program as well.

*Nursing Staff.* In part, services of the diagnostic center's nursing staff were contributed by the official health agencies participating in the survey, that is, the State and local health departments and the Public Health Service. Additional nurses needed to complete the center's staff were recruited locally and employed by the survey organization for the duration of the project.

In all, 10 full-time nurses served at the diagnostic center throughout the period of its operation. One of these nurses, who served in a supervisory capacity, was assigned by the Denver Bureau of Health and Hospitals, while another, who served as a consultant, came from the Colorado State Department of Public Health. In addition to the full-time staff, the center had the assistance of many part-time nurses who were assigned by some of the official and voluntary agencies, especially during the period when the case load was at its peak.

It should be pointed out that the nurses assigned to the diagnostic center were responsible only for work at that location. Responsibility for meeting the increased need for public health nursing service in the field was left entirely to the local, official health agencies.

At the diagnostic center, the nurse occupied one of the key positions. Because available medical staff services were limited and had to be used economically, certain functions which would ordinarily be carried out by the physician had to be assigned to the nursing staff. The nurse was therefore responsible for taking the clinical history and for establishing the necessary personal rapport with the patient.

it was her task to explain to the patient the reason for his recall to the center and to acquaint him with the procedures that would be required to establish a diagnosis. In addition, the nurse had the responsibility for performing tuberculin and other skin tests, extracting gastric contents for bacteriological studies, and for instructing the patient regarding the collection of sputum. Upon completion of diagnostic studies in an individual case, it was the nurse's responsibility to impress upon the patient the importance of carrying out the physician's recommendations concerning medical care and further follow-up.

*Medical Students.* During the summer vacation period, four medical students were assigned to the center to assist the professional staff with routine duties. In this fashion, the staff was augmented for approximately 3 months, and the students were provided an opportunity to gain useful clinical experience. Essentially, their assigned function and responsibilities were similar to those discharged by the nurses. However, since this group consisted of third- and fourth-year students, they were given every opportunity to increase their clinical knowledge through observation and instruction by the medical staff.

*Social Service Staff.* In order to meet the many social, economic, and emotional problems that were bound to present themselves when patients received diagnoses of tuberculosis or other pathological conditions, two full-time medical social case workers were assigned to the diagnostic center for the duration of its operation. One of these medical social workers was loaned to the center by the Public Health Service to work full-time, and a number of additional workers from the community contributed part-time services on a voluntary basis when the case load was at its peak. In addition, the services of the Director of Medical Social Service of the Denver Bureau of Health and Hospitals were made available for general supervision of social work activities.

Because of the rather circumscribed activities of the diagnostic center, the social case-work services available at the center were also necessarily limited. In essence, the prime responsibility of the social worker was to assist the patient to obtain medical care and further follow-up when recommended by the center physician.

The services of the social work staff were especially valuable in the many instances where a patient reacted emotionally to a diagnosis of tuberculosis or other pathological condition. Obviously, the serious and difficult social, economic, and emotional problems brought to light as the result of the discovery of an unsuspected ailment could not be solved within the circumscribed setup of the diagnostic center. However, when such problems were revealed, efforts were made to

assist the patient and his family by referring them to the agency which would be in the best position to provide the necessary service.

*Clerical and Stenographic Staff.* The arduous task of handling a great volume of records and taking care of an enormous amount of correspondence required the services of a large clerical and stenographic staff. Personnel for these functions was provided in part by the Public Health Service and in part through the employment of clerks and stenographers by the survey organization. In addition, a staff member of the Public Health Service was assigned to the diagnostic center as records supervisor for the duration of its operation.

### *Laboratory Services*

Before the program of the diagnostic center could be carried out, it was, of course, necessary to provide adequate facilities for bacteriological studies. Since there were no facilities in the community equipped to handle the great load of laboratory work which would result from the diagnostic center's activities, it was obvious that special arrangements would have to be made for this purpose.

Financial assistance for this work was provided by the Division of Research Grants and Fellowships of the National Institutes of Health, Public Health Service. In addition, two Public Health Service laboratory technicians specially trained in tuberculosis bacteriology were assigned to the survey. As a result, a special laboratory unit was organized to serve a dual purpose: first, to handle the bacteriological work load of the diagnostic center, and second, to support a special research project to determine the diagnostic efficiency of the slide culture method for tubercle bacilli, a rapid culture technique recently developed by Drs. John Berry and Hope Lowry[1 2] of the University of Colorado School of Medicine. Space and major equipment items for the laboratory were provided by the Department of Bacteriology of the Colorado University School of Medicine.

Since these facilities were rather limited, it soon became evident that they could not adequately handle the large volume of work required by the diagnostic center. It was therefore necessary to obtain the assistance of the Division of Laboratories of the Colorado State Department of Health in order to take care of the excess load of laboratory specimens collected at the center.

Although improvised, the laboratory facilities provided for the diagnostic center proved to be reasonably adequate. Problems actually encountered were due in part to the improvised nature of the laboratory facilities and in part to the difficulty in obtaining sufficient numbers of specimens from the patients.

[1] Berry, J. W., and Lowry, Hope: A slide culture method for the early detection and observation of growth of the tubercle bacillus. A preliminary report. Am. Rev. Tuberc. 60: 51 (1949).

[2] Lowry, H., and Berry, J. W.: Further observations on the technic of slide culture of tubercle bacillus. Am. J. Clin. Path. 20: 273 (1950).


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## Operating Policies

In principle, the function of the diagnostic center was to establish, insofar as possible, clinical diagnoses in those persons whose initial screening films had suggested the need for further examination. The principal emphasis, of course, was on the discovery of tuberculosis, including a determination of activity. Diagnostic studies were to be completed within the shortest possible time and were to be limited to those procedures which would be of the greatest practical value from the standpoint of the immediate disposition of each case. Furthermore, cases were to be carried in the diagnostic center only as long as necessary to establish either a definitive or presumptive clinical diagnosis. Prolonged follow-up, where indicated, was to be accomplished through referral to the private physician or to a public clinic. The specific type of referral, either for such follow-up or for treatment, was to be based on the patient's ability to pay for these services, and complete diagnostic information was to be made available to the physician, clinic, or hospital of referral.

As for the specific procedures to be employed in performing the diagnostic studies, policies had to be developed that would be both practical and realistic in terms of the existing limitations and of an expectedly large case load to be disposed of within a limited period of time. Ideally, it would have been desirable to set up uniform standards and criteria for the diagnostic evaluation of all cases, and to require intensive bacteriological studies, tuberculin tests, and, possibly, other skin tests, of all individuals with X-ray findings in any way suggestive of a tuberculous lesion. It was obviously impossible to consider such a program, for, even if the necessary facilities had been available, the practical results would probably not be commensurate with the enormous effort required. Moreover, one could not expect to obtain the degree of cooperation necessary for such laborious and time-consuming procedures with a probable case load of thousands of persons, most of whom would be entirely free of symptoms. It was therefore essential to adopt the principle of selection, with the apparent clinical significance of each case determining the extent of diagnostic study.

A certain amount of data, such as clinical history, 14″ x 17″ X-ray film in the conventional position, and a sputum examination for tubercle bacilli, were set down as the minimum requirements for all cases with abnormal pulmonary findings in the screening film. Further studies, such as additional X-ray films in various positions, fluoroscopy, more intensive bacteriological examinations, tuberculin tests, and other skin tests, were to be carried out only at the request of the physician reviewing the case. In general, determinations regarding more intensive studies were based on consideration of a

patient's past history and present symptoms and on a careful evaluation of the character, extent, and location of the lesion demonstrated on the 14″ x 17″ film.

Considering the large volume of work to be performed within a short period of time, and the fact that facilities were to be limited and improvised, it would have been entirely unrealistic to expect to establish a definite clinical diagnosis in all, or even in a majority of the cases. Nor could this goal be regarded as falling within the scope of a community-wide mass survey. If such a survey succeeds in identifying those persons in need of immediate medical care and treatment and those in need of follow-up, it may be said that the project has achieved its objectives.

In dealing with nontuberculous pathological chest conditions, the aim of the diagnostic center was to be, insofar as possible, the differentiation of such lesions from pulmonary tuberculosis by means of the usual clinical, radiographic, and laboratory studies. If more elaborate examinations, such as bronchoscopy, bronchography, biopsy, and other laboratory studies, seemed to be indicated, appropriate follow-up referrals were to be made.

As for cardiovascular conditions, no provisions were made to carry out the diagnostic elaboration of the screening-film findings through the diagnostic center. It was the opinion of the medical committee that the evaluation of these conditions could not be considered the responsibility of the diagnostic center. All persons with screening films suggesting the presence of cardiovascular abnormalities were therefore to be recalled for an interview, at which time they were to be advised of the need for further examination and referred either to their private physicians or to a free clinic. Because of limited personnel and facilities, no further steps to insure follow-up could be considered.

*Guide for Diagnostic Center Referrals*

Obviously, no hard and fast rules could be made for referrals to the diagnostic center following the interpretation of the 70-mm. screening film. In reading these miniature X-ray films, the physicians assigned to the survey team exercised full independence of judgment in making recommendations for referring patients to the diagnostic center for further study. It was recognized that in a mass survey of this type there would be a relatively large number of individuals showing minor abnormalities in the miniature chest X-ray films. For this reason, it was essential to distinguish such conditions from lesions which, on the basis of their roentgenographic appearance, give the impression of being either of definite or possible clinical significance. As a means of determining the conditions under which referrals to the diagnostic center were to be made, the following guide was set up on the basis of the interpretation of the 70-mm. screening film:

70-mm. film, although not necessarily construed as normal, were not considered in need of a 14″ x 17″ confirmatory film or other diagnostic studies:

1. Lungs:
   a. Scattered, calcified nodules, either single or multiple, few in number.
   b. Slight or indefinite prominence of pulmonary markings consistent with variations in technique and the individual's age.
   c. Anatomical abnormalities, such as azygos fissure or fissure of an inferior accessory lobe.
   d. Small, localized, emphysematous blebs, without other demonstrable abnormal findings.
   e. Metallic foreign body, with no other abnormal findings in the lungs or other intrathoracic structures.
2. Pleura:
   a. Apical pleural caps, in the absence of any indication of a parenchymal lesion.
   b. Slight pleural thickening and adhesions, such as obliteration of the costophrenic sinus or thickening of the interlobar septum without suggestion of possible effusion.
3. Mediastinum and hilar structures—single or multiple calcified foci.
4. Cardiovascular structures:
   a. Elongated, ptotic, or "dropped" heart.
   b. Rotation of heart and greater vessels associated with dorsal scoliosis.
   c. Moderate aortic widening and tortuosity.
   d. Aortic knob calcification.
5. Diaphragm:
   a. Lobulations or serrations which are within normal limits.
   b. Slight elevation, without indication of possible eventration or herniation.
6. Bony thorax:
   a. Congenital or developmental anomalies of ribs, clavicle or other structures of the thoracic cage.
   b. Fractures of ribs or clavicles.
   c. Rib defects resulting from thoracotomy in the absence of significant pulmonary or pleural abnormalities.
7. Spine:
   a. Congenital anomalies.
   b. Arthritic changes.
   c. Slight to moderate scoliosis.
8. Neck:
   a. Calcified lymph nodes.
   b. Calcified blood vessels.
   c. Calcified laryngeal cartilages.
   d. Metallic foreign bodies.

B. *Abnormal Findings.* It is not possible to specify and enumerate the great variety of abnormal chest conditions observable in the miniature films which would require the taking of a 14″ x 17″ confirmatory film or other diagnostic studies. However, when the following conditions were noted in the 70-mm. film, recommendations for further study were generally made:

1. Lungs and pleura—Abnormal pulmonary or pleural findings other than those indicated under A-1 which were either suggestive of a tuberculous lesion or which, on the basis of the miniature film alone, could not be definitely distinguished from tuberculosis.

2. Mediastinum and hilar structures—Findings other than those indicated under A-3 which may cause an enlargement or abnormal appearances of those

structures and which, on the basis of the 70-mm. film, could not be definitely identified as of vascular origin.

3. Diaphragm—Significant elevation of the diaphragm or suspected herniation.
4. Cardiovascular structures:
   a. Cardiac enlargement to the right or left, or both.
   b. Straight left cardiac border.
   c. Prominent pulmonic conus.
   d. Prominent left ventricle (hypertensive or boot-shaped).
   e. Localized prominence of the left ventricular border.
   f. Greater vessel enlargement sufficient to suggest the presence of aneurysm.
   g. Suggestive evidence of pulmonary congestion, i.e., "fuzzy" hilar shadows, "butterfly" perihilar densities, with or without evidence of basal congestion oı pleural effusion.
   h. Absence of aortic knob.
   i. Apparent right-sided aorta.
   j. Calcified pericardium.
   k. Any additional or unusual findings that cannot be definitely classified as conditions which may fall within normal limits.

*Classification of Pulmonary Tuberculosis*

It was proposed that the classification of pulmonary tuberculosis following diagnostic evaluation at the diagnostic center should be based on the accepted "diagnostic standards" of the National Tuberculosis Association (1940 edition). It was recognized, however, that in a certain proportion of cases, a definite determination of the clinical status of the disease would not be possible because of insufficient observation. For this reason, and for the purpose of arriving at an initial disposition of the cases concerned, it was necessary to consider a departure from some of the established standards, especially those dealing with activity status.

Thus, it was recognized that certain cases would have to be considered active and probably in need of treatment on the basis of clinical and X-ray findings alone, even without the presence of confirmatory bacteriological findings. On the other hand, it was expected that a much larger number of cases would be found on the routine X-ray in which the lesions, although detected for the first time, could with reasonable safety be classified as inactive on the basis of the roentgenographic appearance. This was felt to apply particularly to lesions of minimal extent which were expected to make up a large proportion of all cases of tuberculosis found in the survey. It was therefore considered impractical and inadvisable to insist on a specified period of observed stability before classifying such cases as inactive tuberculosis.

Finally, it was acknowledged that certain cases would definitely require a certain period of follow-up observation in order to make any determination of the activity of the lesion. These cases were to be classified as of undetermined activity, and careful follow-up to determine their actual clinical status was to be recommended for

these patients. With the exception of these cases, classifications were to be assigned as follows:

1. According to stage of disease:
   Minimal.
   Moderately advanced.
   Far advanced.
2. According to activity:
   Active.
   Inactive.

## Operating Procedures

The diagnostic center was in operation from July 5 to October 31, 1949, a period of nearly 4 months. The work schedule involved the usual 8-hour day, 5 days a week, and one evening session per week. The operating routine employed in the center during that period is presented graphically in the chart.

The case load at the center showed a rapid increase from the start, reaching a peak of 300–350 patient visits per day, at which point it remained for a period of approximately 6 weeks. During the subsequent weeks, there was a gradual decline in the volume of work at the diagnostic center because of the decreasing numbers of persons participating in the survey during this period and because of the large number of persons who had already been cleared through the center in the preceding weeks of operation.

The total number of persons who were requested to report to the diagnostic center amounted to 9,783 (excluding 863 persons with abnormal small-film findings not requested to return to the diagnostic center because they resided outside the survey area). Of these, a total of 8,003 persons made one or more visits to the center. In other words, 81.8 percent of those invited to report to the diagnostic center actually did so.[8] Table 1 shows in detail the number of persons invited to return to the diagnostic center and the number who responded to the invitation; it should be noted that these figures refer to the type of abnormality observed in the initial screening film prior to clinical evaluation at the diagnostic center. It should also be pointed out that the total number of persons in whom a clinical diagnosis could actually be determined was higher than indicated in table 1 since necessary information on a certain number of cases who did not report was obtainable from other sources, such as private physicians, institutions, and tuberculosis case registers.

In all, the number of patient visits to the diagnostic center amounted to 15,234. Thirty percent of the cases made one visit only. This group consisted mainly of two types of cases: (a) Those whose initial screening films had been classed as "suspect" and whose subsequent

[8] Approximately 600 of those who failed to report to the center were found to be under medical supervision, and no effort was made in these cases to obtain response to the recall notification.

DENVER AND TRI-COUNTY CHEST X-RAY SURVEY

Classification of X-ray Findings and Disposition of Cases

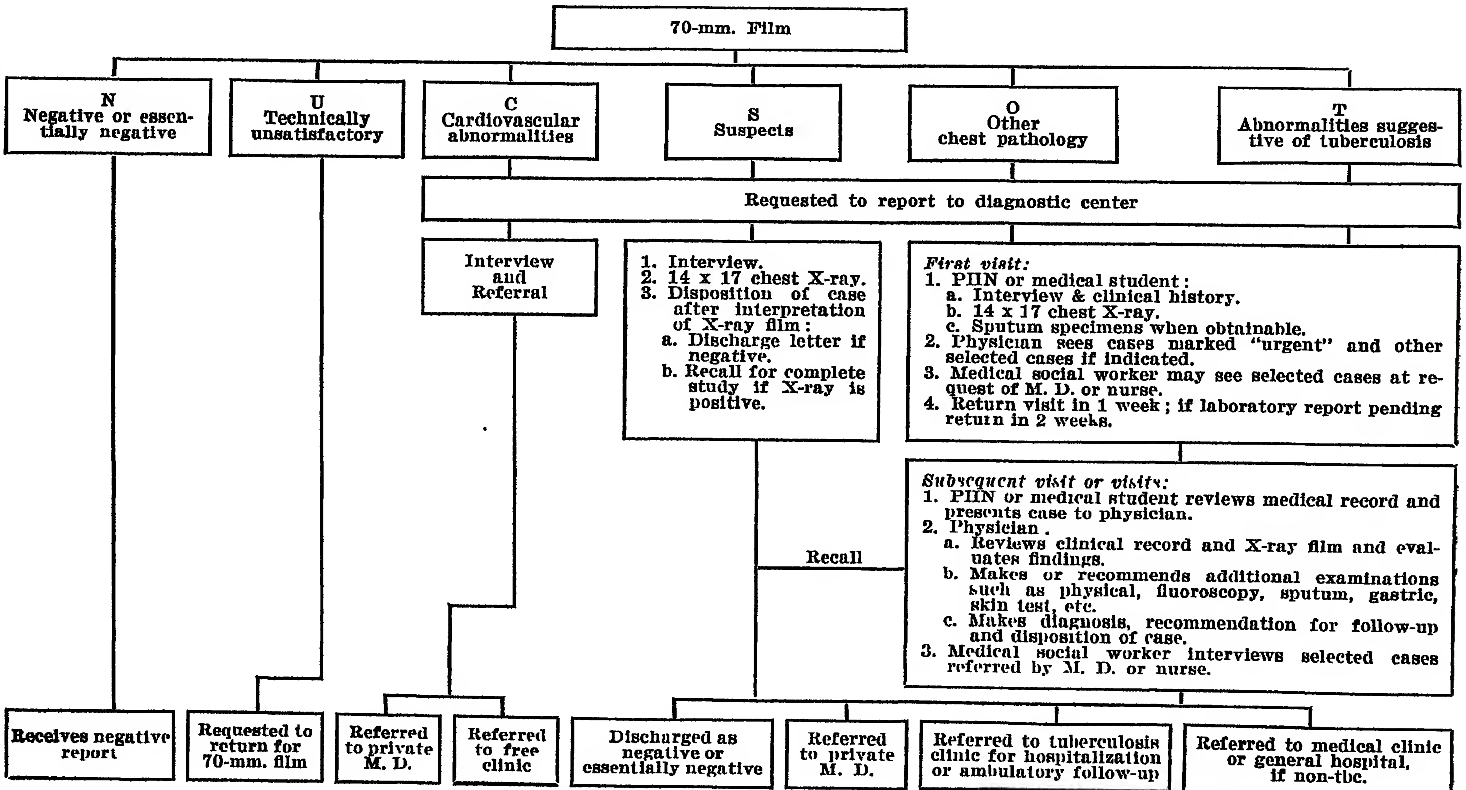

Table 1. *Response to diagnostic center recalls*

| 70-mm. film interpretation | Number of persons invited | Number of persons responding | Percent of response |
|---|---|---|---|
| Tuberculosis | 4,016 | 3,230 | 80.4 |
| Other chest pathology | 1,660 | 1,389 | 83.7 |
| Suspects | 2,599 | 2,273 | 87.5 |
| Cardiovascular | 1,508 | 1,111 | 73.7 |
| Total | 9,783 | 8,003 | 81.8 |

14″ x 17″ X-ray films were interpreted as essentially negative; these persons were notified of the results by letter and were not requested to return for a subsequent visit. (b) Those whose 70-mm. X-ray films had suggested cardiovascular abnormalities and who were recalled merely for interview and referral; no further studies were carried out for these persons at the diagnostic center.

About 59 percent of the patients made two visits each, and the remainder, 11 percent, made three or more visits to the diagnostic center. The limited number of visits which were made by the majority of the cases may be regarded as an indication of the "streamlined" procedures which were of necessity adopted for the diagnostic center.

The total number of persons who had 14″ x 17″ chest X-ray films taken at the diagnostic center amounted to 7,611. In a majority of these cases, the radiographic examination was limited to a single film in the conventional position. In a considerable number of cases, however, additional roentgenograms, including oblique, lateral, and lordotic views of the chest, as well as esophagrams, were obtained at the request of the examining physician.

At the diagnostic center, collection of sputum specimens and extraction of gastric contents was a daily routine procedure. Similarly, tuberculin skin testing and, in many cases, histoplasmin and coccidioidin skin tests were also employed at the request of the examining physician. The tuberculin used was OT in a dilution of 1 : 10,000 as the first strength, and 1:100 as the second strength. Histoplasmin and coccidioidin skin-test antigens were used in the standard dilutions of 1:100. The use of these skin tests proved of great help in excluding the tuberculous etiology of many lesions of questionable origin and in directing the physicians' attention toward diagnostic possibilities other than tuberculosis.

### *Work-up and Disposition*

All patients referred to the diagnostic center for study following the interpretation of the 70-mm. screening film were subjected to a predetermined routine of diagnostic work-up and disposition. The specific procedures to be employed in each case depended largely on the 70-mm. film impression. The cases were divided into three general

categories: (a) those patients whose initial screening films had been classified as "tuberculosis" or "other chest pathology"; (b) those whose 70-mm. films had been classified as "suspect" (i. e., those with questionably abnormal or indeterminate film findings); and (c) those classified as "cardiac."

*Tuberculosis and Other Chest Pathology.* Persons suspected of having tuberculosis or other chest pathology received a letter requesting them to report to the diagnostic center for further study. During the first visit, the patients were received by a public health nurse or a medical student who explained the reason for the recall to the diagnostic center and recorded identification data and clinical history. A 14″ x 17″ chest X-ray was then made, and sputum specimens were collected when they were available. If the case had been marked as "urgent" by the reader of the miniature film, or if the patient indicated that he was aware of the condition for which he had been recalled to the diagnostic center, a physician was asked to see the patient to determine what further steps should be taken. Where social, emotional, or economic problems were apparent during this first visit or in subsequent ones, the patients were referred to the medical social worker assigned to the center. Each patient was given an appointment to return to the diagnostic center in 1 week if no sputum was being collected. If, however, sputum had been collected or was being collected, the patients were asked to return in 2 weeks.

At each subsequent visit to the diagnostic center, each patient was received by a public health nurse or a medical student who reviewed the medical record to determine whether it had been properly filled out and to add all necessary information which had not been obtained at the time of the previous visit. The patient was then directed to a physician who, in turn, reviewed the medical record and entered necessary additions. The physician then read the 14″ x 17″ confirmatory film, recorded the findings, and interpreted them to the patient. Where indicated, the physician carried out physical examination and fluoroscopy and made any necessary recommendations for further study, such as the examination of gastric washings or skin tests. In cases where these additional studies had already been conducted, the physician interpreted the findings to the patient. Finally, if it was the physician's opinion that adequate information was available to permit either a definite or presumptive diagnosis, the diagnosis was recorded together with appropriate recommendations for further follow-up. The case was then discharged from the diagnostic center.

*Suspects.* Persons classified as "suspects" on the basis of the miniature film received a letter requesting them to return to the diagnostic center. They were interviewed by a public health nurse or a medical student who explained why they had been asked to report to

the diagnostic center and recorded the essential identifying data together with a brief clinical history. A 14″ x 17″ chest X-ray was then taken, but no other studies were carried out unless indicated by the findings on the confirmatory film. The patient was advised that he would receive a letter stating either that the 14″ x 17″ film had not revealed findings requiring any further medical attention or that he was to return to the diagnostic center for further examination. In the latter event, the subsequent procedures were essentially the same as for persons whose 70-mm. films had been classed as either "tuberculosis" or "other chest pathology."

*Cardiovascular Diseases.* Persons whose miniature films indicated findings suggestive of cardiovascular abnormalities received a letter requesting them to report to the diagnostic center. When they appeared at the center, they were interviewed by a public health nurse or a medical student and given an explanation for their recall. They were then given a letter of referral to a private physician or to a free clinic, depending on their financial status and ability to pay for further follow-up and care.

*Nonrespondents*

It was to be expected that some of the persons requested to report to the diagnostic center would fail to do so for one reason or another. For example, some of those asked to return for further study notified the center that they were aware of the abnormal chest conditions which had resulted in their recall notifications, and indicated that they were already under medical supervision. Others informed the center that they had elected to receive medical follow-up from their own physicians. In all such instances, the staff of the diagnostic center made the appropriate follow-up contacts (with private physicians, clinics, hospitals, and other agencies) in order to verify the patients' statements and to obtain the clinical information needed to close the cases at the center.

With those persons who failed to report to the center after two letter notifications and who furnished no information indicating medical follow-up, the following action was taken:

1. The initial screening films were re-evaluated by the center's medical director or his representative in order to eliminate those for whom further follow-up did not appear to be essential. Thus, attention was focused on those most probably in need of further follow-up study and in whom further efforts would be most productive in terms of the probable significance of the small-film findings. Moreover, this selective approach assured the best utilization of the limited resources available for the follow-up of nonrespondents.

2. After review of the screening films, those cases felt to be of sufficient significance to warrant further effort were referred to the

center's public health nursing staff for follow-up by telephone. If these efforts failed—if the patient could not be reached by telephone, or if he failed to report to the center after several telephone calls—the case was then referred to the health department's field nursing staff for follow-up by home visit.

3. Home visits were made by health department field nurses during which efforts were made to convince the patients of the need for further diagnostic study either at the center or under other auspices.

4. In cases where all follow-up efforts failed, or where the individuals could not be reached, the 70-mm. screening films were again reviewed in order to find those with probable diagnoses of significant tuberculosis. These were turned over to the health department for follow-up through established facilities and procedures. In cases where 70-mm. films suggested nontuberculosis chest pathology, no further follow-up efforts were made, and no report was filed with the health department.

### *Laboratory Procedures*

At the time of the 14″ x 17″ X-ray examination, all patients whose miniature films had been classified as "tuberculosis" or "other chest pathology" were given one sputum bottle and instructions for collecting a 48-hour sputum specimen. The specimens were returned by the patients to the diagnostic center or to other designated stations. Upon receipt in the laboratory, 15 cc. of sputum were removed from the entire specimen and homogenized in a paint shaker (where the specimen amounted to less than 15 cc., the whole specimen was used). The homogenized specimen was then divided into two equal parts and treated as follows:

1. Routine method: the specimen was concentrated with sodium hydroxide and a smear was made of the concentrate. Simultaneously, three tubes of Petragnani's medium were inoculated; cultures were discarded at the end of 8 weeks.

2. Slide culture method: three thick smears were made, treated with acid, washed with water, and incubated in Kirshner's medium with albumin added. After the 2d, 4th, and 6th day, respectively, one culture was removed, stained, and examined under the microscope.

Patients who produced no sputum were, upon direction of the examining physician, given appointments to return to the diagnostic center for gastric lavage. Where possible, three gastric specimens were obtained for examination by culture. Specimens were neutralized immediately with sodium hydroxide, refrigerated, and delivered to the laboratory by 10 a. m. At the laboratory, specimens were centrifuged and sediment was divided into two equal parts, after which procedures for the routine culture method and the slide culture method were followed. No direct smear was made.

In all cases referred for bacteriological work-up, the laboratory

kept careful records of the patient's name and survey number, the culture number, and of the results of the smear, the slide culture, and the routine culture. Daily reports were returned to the diagnostic center on a form provided for that purpose, together with all other available information. Smears were reported in the following manner:

a. No AFB seen.
b. 1, 2, 3, 4, 5 AFB seen.
c. Few AFB.
d. Many AFB.
e. Numerous AFB.

Slide cultures were reported as follows:

a. Negative at 2, 4, or 6 days.
b. Positive at 2, 4, or 6 days.

Routine cultures were reported as follows:

a. No growth present.
b AFB present.

## Results [4]

In all, 326,326 photoroentgen films were taken in the survey. Of this total, 2,230 were technically unsatisfactory for diagnostic interpretation, so that the remaining films, totaling 324,096, can be considered as representing the actual number of persons participating in the survey. Except where otherwise noted, the analysis of abnormal findings is based on diagnoses made at the diagnostic center. However, 82 percent of the cases included in the group of cardiovascular abnormalities were so classified on the basis of 70-mm. film impressions and not upon a clinical diagnosis.

Table 2 summarizes the general findings of the survey. As indicated, 97.5 percent of all persons participating in the screening program were found to be essentially negative, either on the basis of the initial 70-mm. film or following study at the diagnostic center.

Translating the percentages shown for tuberculosis into rates per 1,000 persons examined, it is apparent that tuberculosis prevalence among the surveyed population was about 13 per 1,000. Cases classed as active tuberculosis amounted to 1 per 1,000. These rates are roughly comparable with findings of other mass X-ray surveys.

Included in the group of nontuberculous chest conditions was a large variety of abnormal findings ranging from abnormalities of little clinical significance to serious conditions requiring immediate medical attention. Among the more significant pathological conditions were 231 cases of bronchiectasis and other chronic, inflammatory, or suppurative diseases of the lungs and bronchi; 240 cases diagnosed either as definite or possible intrathoracic neoplasm; and 335 cases of silicosis.

[4] A more complete statistical analysis and interpretation of the survey findings will appear in a later issue.

It should be pointed out that the data concerning the frequency of nontuberculous chest lesions are of a preliminary nature, since the majority of the diagnoses were based on clinical and radiographic findings alone. In keeping with diagnostic center policy, the exhaustive studies necessary to establish final diagnoses were not undertaken.

Table 2. *Number and percent of cases by broad diagnostic classification*

| Findings | Number | Percent |
|---|---|---|
| Total persons surveyed | 324,096 | 100.0 |
| Essentially negative | 315,911 | 97.5 |
| By 70-mm. film | *314,381* | *97.0* |
| By diagnostic center | *1,530* | *.5* |
| Tuberculosis | 4,231 | 1.3 |
| Active | *366* | *.1* |
| Questionably active | *544* | *.2* |
| Inactive | *3,321* | *1.0* |
| Other chest pathology | 2,261 | .7 |
| Cardiovascular abnormalities | 1,693 | .5 |
| By 70-mm. film | *1,390* | *.4* |
| By diagnostic center | *303* | *.1* |

Data concerning cardiovascular abnormalities are based chiefly on 70-mm. film impressions since most of these cases were not given clinical study at the diagnostic center.

### *Source of Diagnosis*

Table 3 shows the distribution of diagnosed cases according to source of diagnosis. Cardiovascular abnormalities were excluded, since as explained above, the majority of these cases were classified on the basis of the 70-mm. film alone and since information on clinical follow-up was lacking.

Table 3. *Distribution of diagnosed cases by source of diagnosis*

| Source of diagnosis | All diagnoses | | Tuberculosis | | Chest pathology other than tuberculosis | |
|---|---|---|---|---|---|---|
| | Number | Percent | Number | Percent | Number | Percent |
| Total | 6,492 | 100.0 | 4,231 | 100.0 | 2,261 | 100.0 |
| Diagnostic center | 5,312 | 81.8 | 3,368 | 79.6 | 1,944 | 86.0 |
| Tuberculosis case register | 49 | .8 | 47 | 1.1 | 2 | .1 |
| Other sources | 238 | 3.7 | 190 | 4.5 | 48 | 2.1 |
| 70-mm. film only [1] | 893 | 13.7 | 626 | 14.8 | 267 | 11.8 |

[1] For the purpose of statistical analysis, tentative diagnostic classifications were assigned to those remaining cases on the basis of a review of the 70-mm. film.

It will be noted that nearly 82 percent of all cases of tuberculosis and other chest pathology were diagnosed by the diagnostic center. However, the percentage of cases seen by the diagnostic center was somewhat higher for those with nontuberculous chest conditions than for those with tuberculosis. This difference may, perhaps, be explained by the fact that many of those diagnosed as tuberculous had

had previous knowledge of their condition, and hence, had failed to report to the diagnostic center.

By the end of 1949, either definite or presumptive diagnoses had been established in 85.2 percent of the tuberculosis cases and in 88.2 percent of those with other chest pathology. In the remainder of the cases, no information concerning clinical follow-up was available as of that date.

*Disposition*

At the conclusion of studies at the diagnostic center, 73 percent of all tuberculosis cases for whom further follow-up was recommended were referred to private physicians, and 27 percent were sent to clinics. The majority of the latter were referred either to clinics operated by official health agencies or to outpatient services of the Veterans' Administration.

Of those with active tuberculosis, 42 percent were referred to private physicians, and 58 percent to public health clinics or other agencies providing free medical care. Since the entire group of tuberculosis cases consists predominantly of inactive cases, in a ratio of about 10 inactive cases to 1 active case, the difference between the referrals of the active cases alone and all cases may have significance. The fact that a larger proportion of the active cases were referred to public facilities, may, perhaps, indicate a generally lower socioeconomic status for this particular group than for the entire group of tuberculosis cases.

Provision of institutional care was not the direct responsibility of the diagnostic center. Instead, tuberculosis patients in need of such care were referred to the agency responsible for initiating hospitalization efforts. It should be mentioned in this connection that a considerable number of patients who had originally elected follow-up by private physicians were subsequently referred by their physicians to the public health clinic for further follow-up and for assistance in arranging for institutional admission.

As for patients with chest conditions other than tuberculosis, medical follow-up recommendations by the diagnostic center referred 83 percent to private physicians. The remainder, 17 percent, were referred to public hospitals or out-patient services.

As indicated, the incorporation of a diagnostic center in the Denver and Tri-County Chest X-ray Survey made possible the clinical diagnosis of the majority of "suspects" found in the survey. Obviously, it is still too early to assess the long-range effects of the survey on the tuberculosis control program of the surveyed areas. The indications are, however, that the prompt clinical evaluation of the "suspects," carried out as an integral part of the survey program, will go a long way toward providing the medical care and follow-up

so essential to the prompt restoration of the individual patient and to the protection of the community.

ACKNOWLEDGMENTS

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## —Announcement—

### Courses in Laboratory Diagnosis of Tuberculosis

In cooperation with the Division of Chronic Disease and Tuberculosis, Public Health Service, the Bacteriology Laboratories of the Communicable Disease Center, Chamblee, Ga., will offer three courses in the laboratory diagnosis of tuberculosis on the following dates:

April 30 to May 11, 1951.
November 5–16, 1951.
November 19–30, 1951.

The courses are open to all grades of employed laboratory personnel who are approved by their State health officers. Practical laboratory training in all phases of tuberculosis bacteriology, including preparation of culture media, microscopy, cultural procedures, diagnostic use of animals, and testing of drug sensitivity will be included in the course. No tuition or laboratory fees are charged.

While reservations for the courses should be made well in advance, there are still a few places available in the course beginning April 30.

In addition, similar courses will be given for laboratory directors, senior laboratory staff members, physicians, and others of comparable professional standing on the following dates:

May 14–18, 1951.
October 29 to November 2, 1951.

Additional information and applications may be obtained from the Chief, Laboratory Services, Communicable Disease Center, Public Health Service, Chamblee, Ga.

# BCG Vaccination in Czechoslovakia [1]

After the Second World War, tuberculosis became so widespread in Europe as to create an emergency. Living conditions were generally far below healthful standards, and public health activities were hampered by shortages of supplies and personnel. It was in such a setting that the Joint Enterprise, later known as the International Tuberculosis Campaign, came into being in 1948. Created by the United Nations International Children's Emergency Fund and three Scandinavian voluntary organizations (Danish Red Cross, Norwegian Relief for Europe, and Swedish Red Cross), the ITC was set up in collaboration with the World Health Organization to promote and direct large-scale BCG vaccination programs. By the end of November 1950, some 30 million children and adolescents had been tuberculin tested and almost half as many vaccinated with BCG in campaigns in many countries.

In order that this emergency control measure might contribute also to scientific knowledge about tuberculosis and about BCG, the World Health Organization established the Tuberculosis Research Office at Copenhagen in 1949. "Mass BCG Vaccination in Czechoslovakia 1948–49," is the first published report of a series which will constitute a record from many countries of Europe and other parts of the world where the ITC has conducted vaccination programs. This report was prepared by the staff of the TRO in Copenhagen. It is based on records from the field teams and preliminary tabulations made in the headquarters of the campaign in Bratislava.

A brief description of the operation is given, with details about number of personnel, methods, and expenditures. The Scandinavian teams assumed responsibility for the training of local personnel, and the objective was to cover all persons between the ages of 1 and 20 years throughout the entire country "in accordance with the Czechoslovak Antituberculosis Law of 20 March 1948." At the height of this campaign 46 teams totaling some 260 workers in the field accomplished about 350,000 tuberculin tests per month, and when the work was completed within a year, over 3 million tuberculin tests had been given, covering a very high proportion of the population in the 1–20 age groups. Vaccinations were given to an estimated 86 percent of the total number of tuberculin negative children of school age (6–14) and to a somewhat lower proportion of younger and older children.

[1] A review of "Mass BCG Vaccination in Czechoslovakia 1948–49, with Special Reference to Statistics on Tuberculin Testing and BCG Vaccination" Prepared by the Tuberculosis Research Office, World Health Organization, Copenhagen. Published by the International Tuberculosis Campaign, August 1950 Copies may be obtained from the International Tuberculosis Campaign, Svanemllevej 25, Copenhagen, Denmark.

An example of successful and efficient international cooperation, the campaign was remarkable in organization, magnitude, and speed and quality of field work.

The report competently condenses a vast amount of material in order to present essential information on the operation, including extensive tabulations of participation, tuberculin sensitivity, and vaccinations performed, by age, sex, and detailed geographic subdivisions. The data which are perhaps of greatest general interest at the present time are those on tuberculin sensitivity. Of all those children who had completed tests, 32 percent were tuberculin positive. The percentage rose sharply from 3.8 in the 1-year-olds to 75.2 in the 20–24 year age group. At age 5 it was 11 percent; at age 10, 26 percent; and at age 15, 48 percent. There was little difference in tuberculin sensitivity between boys and girls, and, interestingly enough, between populations of urban and rural districts, at least in the 13 districts where separate tabulations were made. Details of both tuberculin testing and BCG vaccination are given in comprehensive tables and in a number of excellent charts and maps.

The report was prepared with a consideration for the possibility of future attempts to evaluate BCG vaccination. If tuberculosis morbidity and mortality show a definite trend in the years to come, indirect and limited evidence may be found to show a protective value of mass vaccination. In any future study, the present document will be an indispensable guide. The Tuberculosis Research Office has made a valuable contribution in setting a standard that will be a model for other reports.

# Incidence of Disease

*No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring*

## UNITED STATES

### Reports From States for Week Ended March 17, 1951

*Influenza*

In collaboration with the Influenza Information Center, National Institutes of Health, the following report on influenza has been prepared.

A total of 16,290 cases of influenza was reported for the current week compared with 14,448 for the previous week, 18,506 for the same week last year, and 3,362 cases for the 5-year median.

The large cities in the following sections showed an increase in the number of deaths from all causes for the week ended March 17 as compared with the 5-year median: New England, 20.7 percent; Middle Atlantic, 7.8; East North Central, 10.7; and 16.4 percent in the Pacific area. Other areas showed no increases.

Two more influenza A-prime strains resembling those isolated last year have been recovered by the Regional Laboratory in Albany, N. Y. One was from a patient in Albany, and the other from a patient in Buffalo, and both were ill in mid-February.

Dr. Herman Bundesen, Chicago Board of Health, reports that the outbreak of respiratory infections was widespread in Chicago, but was a mild type, generally. Some cases had typical symptoms of influenza. Duration of symptoms was approximately 1 week. Recovery of A-prime virus was reported previously.

Influenza A-prime virus was isolated from the throat washings of an 8-year-old child living in the Washington, D. C., area by the National Institutes of Health. The onset of symptoms was about the middle of February.

The Preventive Medicine Division, Office of the Surgeon General of the Army, reports that the Second Army Medical Laboratory has isolated influenza A-prime virus from pooled nasal washings collected at Camp Pickett, Va., February 14; in addition, 3 out of 12 paired sera from Camp Breckinridge, Ky., were found positive for antibody rise against type A-prime influenza virus.

Incidence of influenza has increased in the Charleston, S. C., area according to Dr. Ben H. Boltjes, Department of Bacteriology of the Medical College of South Carolina. Influenza A-prime virus was isolated from throat washings from four students of the Medical College, and diagnosis made by the complement fixation test in five students.

The Collaborating Laboratory at the University of Washington, Seattle, reports that of 32 paired sera, 17 have shown a significant rise in titer against influenza A-prime virus by the complement fixation test. For the week ended March 17, 5,847 cases of influenza or influenzalike respiratory infections were reported in the State of Washington. However, the incidence appears to be declining.

Dr. Erickson, Oregon State Health Officer, reports that influenza in unusual numbers has been reported from widely scattered areas of the State during the past 4 weeks. Jackson County (population of 58,000) has reported 1,750 cases during the past 3 weeks. Absenteeism in schools has increased from an average of 7 to 15 percent. Cases reported correspond clinically with mild influenza but laboratory confirmation has not been completed.

A report from Dr. Morris Schaeffer, Director, Regional Laboratory, Montgomery, Ala., indicates that there was an unusual prevalence of influenza in Montgomery which reached its peak in the middle of February. There was little or no mortality associated with it. Influenza A-prime virus was recovered from throat washings and identified as the infecting type in 13 other cases tested serologically in this area.

Dr. C. C. Kuehn, Louisiana Department of Health, reports that about the middle of February there was a community-wide outbreak of a respiratory disease in and around Baton Rouge. A diagnosis of influenza was established by a significant rise in hemagglutination-inhibition titer for influenza virus A. The laboratory work was done by Dr. John Buddingh, Louisiana State University, who has also collected throat washings for virus isolation. A large number of influenzalike infections have occurred throughout the State. School absences have been numerous, 56 percent in one instance.

Morris Pollard of the University of Texas reports that, in addition to the previously reported outbreak of influenza in Galveston, Beaumont, and Orange, Tex., experienced even more intense outbreaks. There was no unusual mortality, and the outbreak has now waned.

Dr. E. H. Lennette, Director, Regional Laboratory, Berkeley, Calif., reports the serological diagnosis of 57 cases of 107 paired sera tested during the week of March 3–9. Since January 1, of 471 individuals tested, 201 have shown serological evidence of influenza virus A and A-prime infections, and 2 have been positive for influenza virus B in 17 scattered counties. A total of 1,150 additional cases of an influenzalike infection was reported in two northern counties, but influenza appears to be subsiding elsewhere.

*Mumps*

Dr. A. S. Lazarus, University of Washington, Seattle, reports that local outbreaks of mumps have resulted in several cases of encephalitis without parotitis or with mild parotitis. Complement fixation tests have shown significant increases in titer and have been of diagnostic assistance.

*Typhoid Fever*

Dr. R. M. Albrecht, New York State Department of Health, reports that the 12 cases of typhoid in a State hospital for the mentally ill had onsets ranging from January 16 to March 1. The cases occurred in all wards of one building. Water and milk supply is common to several buildings, and the kitchen serving the involved building serves two others. The infection is thought to have originated from a carrier, as yet unknown, but secondary cases have occurred.

*Poliomyelitis*

Dr. Winona Campbell, University of Colorado Medical Center, reports the occurrence of a localized epidemic in a Spanish-American family in San Louis Valley in southern Colorado. Two members had paralysis, and several others had suspicious illnesses. A death in the community has been reported in which poliomyelitis was suspected. Another outbreak of 14 cases of poliomyelitis has occurred since the first of the year in Fort Collins, Larimer County, located in the northern part of the State. Six cases were in adults and 4 of the 14 were reported as bulbar type. Only 2 cases of poliomyelitis were reported in Larimer County in 1950.

*Trichinosis*

Dr. R. M. Albrecht, New York State Department of Health, has reported an outbreak of eight cases of trichinosis in one family in Plattsburg. Dates of onset were: one case January 1, one January 5; and six, January 8. Symptoms consisted of diarrhea, fever, and muscle pains. Eosinophilia ranged from 18 to 73 percent. Poorly cooked local pork, a specimen of which revealed large numbers of *Trichinella spiralis* larvae, caused the outbreak.

*Infectious Hepatitis*

Dr. B. G. Hamilton, Missouri Director of Health, has reported the occurrence of two epidemics of infectious hepatitis in two different counties located in the central part of the State. In Calloway County there have been 29 cases, and in Cooper County 28 cases in the past 3 months. School-age children and adults have been affected. New cases are occurring in both areas. No deaths have been reported.

Dr. W. L. Halverson reports 14 cases of infectious hepatitis with 5 in one rural district and 8 in another rural area. The onsets of cases

have been spread over a 4-month period beginning in November 1950, with 4 new cases in February. A history of contact was found in each group, but water and sewage disposal had also been suspected.

*Food Poisoning*

Dr. R. M. Albrecht, New York State Department of Health, has reported an outbreak of staphylococcus enterotoxin food poisoning involving a number of patients and personnel at a general hospital in central New York State February 7. A similar episode occurred February 14. The vehicle in the first outbreak was chocolate eclairs, and in the second, codfish cakes. These foods were infected by the chef whose hands were affected with an allergic dermatitis. Cultures from his hands, the chocolate eclairs, and the codfish cakes revealed *Staphylococcus aureus*.

***Comparative Data for Cases of Specified Reportable Diseases: United States***

[Numbers after diseases are International List numbers, 1948 revision]

| Disease | Total for week ended— | | 5-year median 1946–50 | Seasonal low week | Cumulative total since seasonal low week | | 5-year median 1945–46 through 1949–50 | Cumulative total for calendar year— | | 5-year median 1946–50 |
|---|---|---|---|---|---|---|---|---|---|---|
| | Mar. 17, 1951 | Mar. 18, 1950 | | | 1950–51 | 1949–50 | | 1951 | 1950 | |
| Anthrax (062) | 1 | 1 | ------- | (1) | (1) | (1) | (1) | 16 | 5 | 10 |
| Diphtheria (055) | 68 | 153 | 170 | 27th | 3,915 | 6,057 | 8,743 | 1,008 | 1,786 | 2,385 |
| Encephalitis, acute infectious (082) | 26 | 17 | 9 | (1) | (1) | (1) | (1) | 149 | 137 | 94 |
| Influenza (480–483) | 16,290 | 18,506 | 3,362 | 30th | 81,736 | 85,145 | 85,145 | 67,194 | 74,561 | 66,915 |
| Measles (085) | 17,914 | 10,119 | 22,266 | 35th | 168,071 | 93,331 | 178,365 | 139,370 | 74,201 | 152,241 |
| Meningitis, meningococcal (057.0) | 94 | 111 | 99 | 37th | 2,167 | 1,910 | 1,905 | 1,206 | 996 | 940 |
| Pneumonia (490–493) | 2,275 | 3,021 | (2) | (1) | (1) | (1) | (1) | 22,063 | 27,562 | (2) |
| Poliomyelitis, acute (080) | 61 | 73 | 33 | 11th | 33,431 | 42,605 | 25,409 | 1,212 | 1,131 | 612 |
| Rocky Mountain spotted fever (104) | ------ | 1 | ------- | (1) | (1) | (1) | (1) | 3 | 11 | 10 |
| Scarlet fever (050)[3] | 2,508 | 1,880 | 3,129 | 32d | [4] 41,090 | 36,019 | 53,800 | [4] 25,399 | 19,580 | 29,874 |
| Smallpox (084) | ------ | ------ | 1 | 35th | 14 | 20 | 53 | 6 | 12 | 32 |
| Tularemia (059) | 15 | 18 | 16 | (1) | (1) | (1) | (1) | 151 | 254 | 254 |
| Typhoid and paratyphoid fever (040, 041)[5] | 29 | 39 | 48 | 11th | 3,350 | 3,883 | 3,883 | 435 | 510 | 485 |
| Whooping cough (056) | 1,444 | 2,867 | 2,269 | 39th | 39,467 | 49,670 | 49,670 | 17,865 | 28,134 | 24,659 |

[1] Not computed. [2] Data not available. [3] Including cases reported as streptococcal sore throat. [4] Deduction: Georgia, week ended Feb. 24, 2 cases. [5] Including cases reported as salmonellosis.

## Reported Cases of Selected Communicable Diseases: United States, Week Ended March 17, 1951

[Numbers under diseases are International List numbers, 1948 revision]

| Area | Diphtheria (055) | Encephalitis, infectious (082) | Influenza (480–483) | Measles (085) | Meningitis, meningococcal (057.0) | Pneumonia (490–493) | Poliomyelitis (080) |
|---|---|---|---|---|---|---|---|
| **United States** | **68** | **26** | **16,290** | **17,914** | **94** | **2,275** | **61** |
| **New England** | - | **3** | **1,444** | **565** | **3** | **171** | - |
| Maine | - | 1 | - | 12 | 1 | 24 | - |
| New Hampshire | - | - | 664 | 25 | - | 24 | - |
| Vermont | - | - | 67 | 105 | - | - | - |
| Massachusetts | - | 1 | - | 365 | 1 | - | - |
| Rhode Island | - | - | 10 | 2 | 1 | 2 | - |
| Connecticut | - | 1 | 703 | 56 | - | 121 | - |
| **Middle Atlantic** | **12** | **5** | **411** | **2,362** | **16** | **383** | **4** |
| New York | 5 | 3 | [1] 51 | 883 | 6 | 122 | 4 |
| New Jersey | 2 | 2 | 360 | 561 | 3 | 98 | - |
| Pennsylvania | 5 | - | - | 918 | 7 | 163 | - |
| **East North Central** | **5** | **5** | **66** | **3,177** | **25** | **237** | **8** |
| Ohio | 1 | - | - | 820 | 11 | - | 1 |
| Indiana | 1 | - | 13 | 433 | 1 | 20 | - |
| Illinois | 2 | 3 | 11 | 623 | 6 | 99 | 6 |
| Michigan | 1 | 2 | 42 | 517 | 3 | 118 | 1 |
| Wisconsin | - | - | - | 784 | 4 | - | - |
| **West North Central** | **1** | **3** | **20** | **929** | **3** | **46** | **4** |
| Minnesota | - | - | 4 | 94 | - | 5 | - |
| Iowa | - | - | 1 | 32 | 1 | 2 | 2 |
| Missouri | 1 | - | 7 | 311 | 2 | 1 | - |
| North Dakota | - | - | 5 | 129 | - | 16 | - |
| South Dakota | - | 1 | - | 40 | - | - | - |
| Nebraska | - | - | - | 25 | - | - | 2 |
| Kansas | - | 2 | 3 | 298 | - | 22 | - |
| **South Atlantic** | **17** | **2** | **2,604** | **1,382** | **16** | **255** | **7** |
| Delaware | - | - | - | 39 | - | - | - |
| Maryland | 3 | - | 20 | 126 | 2 | 36 | - |
| District of Columbia | - | - | 2 | 69 | 1 | 16 | - |
| Virginia | 3 | - | 446 | 479 | 3 | 95 | - |
| West Virginia | 1 | - | 1,562 | 60 | 1 | 38 | - |
| North Carolina | 4 | 2 | - | 162 | 5 | - | 1 |
| South Carolina | 6 | - | 189 | 22 | - | 29 | - |
| Georgia | - | - | 385 | 369 | 2 | 41 | 1 |
| Florida | - | - | - | 56 | 2 | - | 5 |
| **East South Central** | **7** | **3** | **176** | **687** | **8** | **133** | **10** |
| Kentucky | 3 | - | 23 | 443 | 1 | 7 | - |
| Tennessee | 2 | 1 | 102 | 74 | 6 | - | - |
| Alabama | - | 1 | - | 45 | 1 | 81 | 5 |
| Mississippi | 2 | 1 | 51 | 125 | - | 45 | 5 |
| **West South Central** | **14** | **3** | **800** | **3,876** | **10** | **694** | **6** |
| Arkansas | 4 | - | 466 | 332 | 1 | 90 | - |
| Louisiana | 1 | - | 12 | 68 | 3 | 32 | - |
| Oklahoma | 2 | 1 | 322 | 358 | - | 62 | - |
| Texas | 7 | 2 | - | 3,118 | 6 | 510 | 6 |
| **Mountain** | **1** | **1** | **2,931** | **2,066** | **4** | **161** | **8** |
| Montana | - | 1 | 72 | 64 | 1 | 2 | - |
| Idaho | - | - | - | 26 | - | - | - |
| Wyoming | - | - | - | 282 | 1 | 4 | 1 |
| Colorado | - | - | 33 | 664 | 2 | 28 | 2 |
| New Mexico | 1 | - | 13 | 46 | - | 36 | 2 |
| Arizona | - | - | 2,795 | 855 | - | 91 | 2 |
| Utah | - | - | - | 107 | - | - | 1 |
| Nevada | - | - | 18 | 22 | - | - | - |
| **Pacific** | **11** | **1** | **7,838** | **2,870** | **9** | **195** | **14** |
| Washington | - | - | 5,847 | 661 | 3 | 6 | 2 |
| Oregon | 5 | - | 1,439 | 84 | - | 78 | 3 |
| California | 6 | 1 | 552 | 2,125 | 6 | 111 | 9 |
| Alaska | - | - | 42 | - | - | 4 | 3 |
| Hawaii | - | - | 3 | 5 | - | - | - |

[1] New York City only.
*Anthrax:* New Jersey, 1 case.

## Reported Cases of Selected Communicable Diseases: United States, Week Ended March 17, 1951—Continued

[Numbers under diseases are International List numbers, 1948 revision]

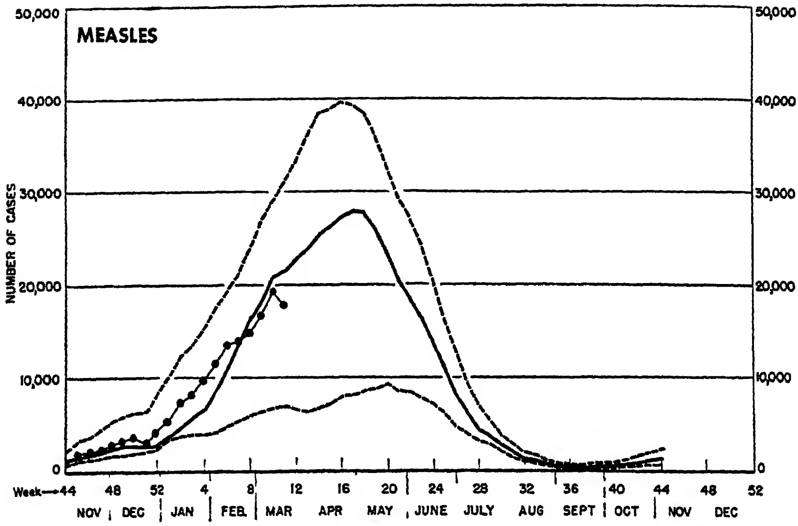
| Area | Rocky Mountain spotted fever (104) | Scarlet fever (050) | Small-pox (084) | Tularemia (059) | Typhoid and para-typhoid fever [1] (040, 041) | Whooping cough (056) | Rabies in animals |
|---|---|---|---|---|---|---|---|
| **United States** | | 2,508 | | 15 | 29 | 1,444 | 166 |
| **New England** | | 203 | | | | 74 | |
| Maine | | 19 | | | | 21 | |
| New Hampshire | | [2] 13 | | | | 5 | |
| Vermont | | 6 | | | | 2 | |
| Massachusetts | | 127 | | | | 33 | |
| Rhode Island | | 9 | | | | 9 | |
| Connecticut | | 29 | | | | 4 | |
| **Middle Atlantic** | | 466 | | 1 | 2 | 255 | 19 |
| New York | | [2] 223 | | | | 107 | 19 |
| New Jersey | | [2] 84 | | | | 74 | |
| Pennsylvania | | 159 | | 1 | 2 | 74 | |
| **East North Central** | | 743 | | 5 | 2 | 230 | 8 |
| Ohio | | 198 | | | 1 | 56 | 1 |
| Indiana | | 87 | | | 1 | 12 | 5 |
| Illinois | | 121 | | 5 | | 28 | 1 |
| Michigan | | 277 | | | | 61 | 1 |
| Wisconsin | | 60 | | | | 78 | |
| **West North Central** | | 138 | | | 4 | 60 | 14 |
| Minnesota | | 51 | | | | 10 | |
| Iowa | | 12 | | | | 4 | 13 |
| Missouri | | 38 | | | 4 | 7 | |
| North Dakota | | 7 | | | | 2 | |
| South Dakota | | | | | | 1 | |
| Nebraska | | 8 | | | | 2 | |
| Kansas | | 22 | | | | 34 | 1 |
| **South Atlantic** | | 222 | | 4 | 3 | 193 | 26 |
| Delaware | | 4 | | | | 2 | |
| Maryland | | 42 | | | | 14 | |
| District of Columbia | | 24 | | | | 2 | |
| Virginia | | 19 | | | 1 | 35 | 2 |
| West Virginia | | 20 | | | | 27 | 2 |
| North Carolina | | 69 | | | | 57 | |
| South Carolina | | 7 | | | | 22 | 14 |
| Georgia | | 15 | | 4 | 2 | 24 | 8 |
| Florida | | [2] 22 | | | | 10 | |
| **East South Central** | | 85 | | 1 | 3 | 71 | 30 |
| Kentucky | | 24 | | | | 16 | 18 |
| Tennessee | | 39 | | | 3 | 36 | 6 |
| Alabama | | 17 | | | | 15 | 3 |
| Mississippi | | 5 | | 1 | | 4 | 3 |
| **West South Central** | | 105 | | 4 | 8 | 357 | 50 |
| Arkansas | | 6 | | | | 18 | 4 |
| Louisiana | | 5 | | | 2 | 4 | |
| Oklahoma | | 14 | | 1 | 2 | 15 | 1 |
| Texas | | 80 | | 3 | 4 | 320 | 45 |
| **Mountain** | | 176 | | | 5 | 126 | 13 |
| Montana | | 5 | | | | 9 | 3 |
| Idaho | | 21 | | | | 4 | |
| Wyoming | | 4 | | | | | 9 |
| Colorado | | 18 | | | 1 | 17 | |
| New Mexico | | 1 | | | 1 | 30 | |
| Arizona | | 12 | | | 3 | 59 | 1 |
| Utah | | [2] 113 | | | | 7 | |
| Nevada | | 2 | | | | | |
| **Pacific** | | 370 | | | 2 | 78 | 6 |
| Washington | | 89 | | | | 24 | 4 |
| Oregon | | 46 | | | | 8 | |
| California | | [2] 235 | | | 2 | 46 | 2 |
| Alaska | | 1 | | | | 6 | |
| Hawaii | | | | | | | |

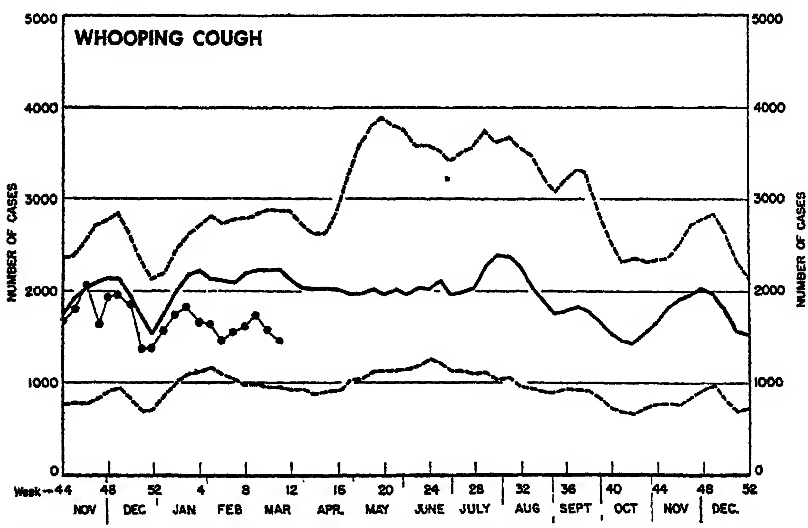
[1] Including cases reported as salmonellosis.
[2] Including cases reported as streptococcal sore throat.

*Psittacosis:* Chicago, Ill., 1 case.

## Communicable Disease Charts

*All reporting States, November 1950 through March 17, 1951*




The upper and lower broken lines represent the highest and lowest figures recorded for the corresponding weeks in the preceding 5 years. The solid line is a median figure for the preceding 5 years. All three lines have been smoothed by a 3-week moving average. The dots represent numbers of cases reported weekly, 1950–51.

# FOREIGN REPORTS

## CANADA

*Reported Cases of Certain Diseases—Week Ended March 3, 1951*

| Disease | Total | Newfoundland | Prince Edward Island | Nova Scotia | New Brunswick | Quebec | Ontario | Manitoba | Saskatchewan | Alberta | British Columbia |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Brucellosis | 7 | | | | | 3 | 1 | 1 | | | 2 |
| Chickenpox | 1,299 | | | 36 | | 290 | 650 | 34 | 66 | 62 | 161 |
| Diphtheria | 4 | | | | | 4 | | | | | |
| Dysentery, bacillary | 14 | | | | | 2 | 5 | | | | 7 |
| German measles | 446 | | | 48 | | 26 | 246 | 1 | 13 | 39 | 73 |
| Influenza | 5,977 | 953 | | 995 | 590 | | 518 | 33 | 999 | | 1,889 |
| Measles | 1,754 | 10 | | 32 | 3 | 344 | 1,136 | 125 | 20 | 43 | 41 |
| Meningitis, meningococcal | 11 | | | 2 | 3 | | 4 | 2 | | | |
| Mumps | 1,212 | 2 | | 11 | | 288 | 402 | 49 | 104 | 249 | 107 |
| Scarlet fever | 307 | 2 | | | 3 | 100 | 55 | 23 | 6 | 32 | 86 |
| Tuberculosis (all forms) | 178 | 14 | | 4 | 6 | 79 | 23 | 13 | 7 | 7 | 25 |
| Typhoid and paratyphoid fever | 7 | | | | | 1 | | | | | 6 |
| Venereal diseases: | | | | | | | | | | | |
| Gonorrhea | 274 | 5 | | 13 | 9 | 77 | 39 | 15 | 17 | 27 | 72 |
| Syphilis | 89 | 3 | | 7 | 2 | 45 | 15 | 2 | 6 | 1 | 8 |
| Primary | 4 | | | | | 1 | | | | | 3 |
| Secondary | 7 | | | | | 7 | | | | | |
| Other | 78 | 3 | | 7 | 2 | 37 | 15 | 2 | 6 | 1 | 5 |
| Whooping cough | 159 | | | 5 | | 49 | 68 | 12 | 6 | 2 | 17 |

## NORWAY

*Reported Cases of Certain Diseases—December 1950*

| Disease | Cases | Disease | Cases |
|---|---|---|---|
| Diphtheria | 16 | Pneumonia (all forms) | 4,863 |
| Dysentery, unspecified | 4 | Poliomyelitis | 48 |
| Encephalitis, infectious | 3 | Rheumatic fever | 72 |
| Erysipelas | 300 | Scabies | 988 |
| Gastro-enteritis | 1,903 | Scarlet fever | 77 |
| Hepatitis, infectious | 42 | Tuberculosis (all forms) | 279 |
| Impetigo contagiosa | 1,771 | Venereal diseases: | |
| Influenza | 18,972 | Gonorrhea | 136 |
| Measles | 692 | Syphilis | 56 |
| Meningitis, meningococcal | 12 | Other forms | 2 |
| Mumps | 59 | Weils disease | 3 |
| Paratyphoid fever | 3 | Whooping cough | 1,475 |

## REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

**The following reports include only items of unusual incidence or of special interest and the occurrence of these diseases, except yellow fever, in localities which had not recently reported cases. All reports of yellow fever are published currently. A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.**

### Cholera

*Burma.* For the week ended March 10, 1951, six cases of cholera were reported in Moulmein, as compared with four for the previous week. The total number reported for the year to date was 11 cases.

*India.* During the week ended March 10, 1951, 107 cases of cholera were reported in Calcutta, as compared with 86 for the previous week.

### Smallpox

*Burma.* During the week ended March 10, 1951, smallpox was reported in ports of Burma as follows: Akyab 22 cases, Moulmein 16, Kyaukpyu 14, and Rangoon 8.

*French West Africa.* For the period February 21–28, 1951, 29 cases of smallpox were reported in Haute Volta, as compared with 50 for the period February 11–20.

*India.* The smallpox epidemic continues in several ports of India. For the week ended March 10, 1951, cases were reported as follows: Calcutta 680, Madras 130, Bombay 103, and Cocanada 26.

*India (French).* The incidence of smallpox in Pondicherry is increasing rapidly. Reported cases rose from 42 for the week ended January 6, 1951, to 109 and 215 for the weeks ended February 17 and 24, respectively.

*Yugoslavia.* During the period January 22–31, 1951, seven cases of smallpox were reported as compared with two for the period January 15–21.

### Typhus Fever

*Iran.* Five cases of typhus fever were reported in Tabriz during the week ended March 10, 1951.

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The printing of this publication has been approved by the Director of the Bureau of the Budget (August 10, 1949).

The PUBLIC HEALTH REPORTS, first published in 1878 under authority of an act of Congress of April 29 of that year, is issued weekly by the Public Health Service through the Division of Public Health Methods, pursuant to the following authority of law: United States Code, title 42, sections 241, 245, 247; title 44, section 220.

It contains (1) current information regarding the incidence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable disease throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

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Librarians and others should preserve their copies for binding, as the Public Health Service is unable to supply the general demand for bound copies. Indexes will be supplied upon request.

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# Public Health Reports

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Communicable Diseases, Fourth Quarter, 1950

FEDERAL SECURITY AGENCY

PUBLIC HEALTH SERVICE

## FEDERAL SECURITY AGENCY

*Oscar R. Ewing, Administrator*

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*Leonard A. Scheele, Surgeon General*

**Division of Public Health Methods**

*G. St. J. Perrott, Chief of Division*

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Public Health Reports

Vol. 66 • APRIL 13, 1951 • No. 15

# Isolation and Characterization of Rocky Mountain Spotted Fever Rickettsiae From the Rabbit Tick *Haemaphysalis leporis-palustris* Packard

By R. R. PARKER, Ph.D., E. G. PICKENS, D. B. LACKMAN, Ph.D., E. J. BELL, D.Sc. and F. B. THRAIKILL*

Parker (*1*) in 1923 and Jellison (*2*) in 1945 noted the probable significance of the rabbit tick, *Haemaphysalis leporis-palustris,* and Nuttall's cottontail rabbit, *Sylvilagus nuttallii,* respectively, in maintaining Rocky Mountain spotted fever in nature in the western United States. In the earlier work no strains of rickettsiae were actually isolated and characterized. The present report deals with the serological and immunological characteristics of strains of rickettsiae isolated from this tick in 1948 and 1949, and particularly their comparison with laboratory strains of spotted fever rickettsiae.

Three hundred and ten *H. leporis-palustris* were obtained from six cottontail rabbits shot July 27, 1948, in Coyote Gulch in the Bitter Root Valley. These ticks were divided into five groups for testing. Each group of 62 ticks was ground in a mortar and suspended in 10 ml. of physiological saline. Each suspension was divided into two portions. One part was used for the intraperitoneal injection of guinea pigs and the other part for inoculation into yolk sacs of developing chick embryos.

An outbreak of salmonellosis then occurred in our guinea pig colony and no isolations of rickettsiae were made from them. However, two of the groups of ticks injected into eggs yielded strains of rickettsiae. During June, July, and August 1949, additional collections of *H. leporis-palustris* were made from 22 cottontails caught in the Bitter Root Valley of western Montana. Using these ticks, three strains of rickettsiae were recovered from guinea pigs inoculated with three lots of ticks and five strains of rickettsiae were recovered from five lots of ticks by direct inoculation into eggs. Three of these latter lots were the same as the three lots from which the guinea pig isolations were made. All strains had similar characteristics in guinea

*From the Rocky Mountain Laboratory (Hamilton, Mont.), Microbiological Institute, National Institutes of Health, Public Health Service. Dr. Parker died Sept. 4, 1949.

pigs, and this paper is mainly concerned with two strains which were picked on this basis as typical of *H. leporis-palustris* strains of rickettsiae.

## Experimental

Penicillin sufficient to make a final concentration of 1,000 units per ml. was added to suspensions before inoculation of eggs to cut down death of embryos due to bacterial contamination. Eggs which had been incubated for 6 days were used, and 0.5 ml. of the tick suspension was inoculated into the yolk sac of each egg.

The record of the isolation of the two strains of rickettsiae used for our experiments follows. The first isolation was made from the yolk sacs of three embryos which died on the fourth day following inoculation. Smears of the yolk sacs, stained by the Macchiavello technique, contained rickettsiae. The yolk sacs were suspended in physiological saline and were used for a second yolk-sac passage However, on this passage a strain of *Neisseria catarrhalis* was present as a contaminant, although rickettsiae could also be seen in the smears of the yolk sacs. The contaminant was eliminated by suspending the yolk sacs for the next two passages in physiological saline containing 2,000 units of penicillin and 500 Sherman units of streptomycin per ml. Subsequent passages were free of the contaminant, and this strain of rickettsia was established in guinea pigs from the yolk-sac material. It is referred to hereafter as the group 2 strain.

The other rickettsial strain was isolated in a similar manner. An actinomycete appeared as a contaminant but was eliminated by suspending the yolk sacs used as inoculum for the third and fourth egg passages in saline containing 2,000 units of penicillin and 500 units of streptomycin per ml. The strain was then established in guinea pigs from the yolk-sac material. It will be referred to as the group 3 strain.

Upon establishment of these strains of rickettsiae in guinea pigs, marked differences were noted when the clinical picture was compared with that of a stock laboratory strain of Rocky Mountain spotted fever rickettsia. In table 1 are presented the comparative observations made on 20 guinea pigs injected intraperitoneally with 1 ml. of blood from passage guinea pigs infected with the rabbit-tick (*H. leporis-palustris*) strain of rickettsia and 20 guinea pigs infected in a similar manner with a laboratory strain of Rocky Mountain spotted fever rickettsiae originally isolated from *Dermacentor andersoni* ticks and maintained in the laboratory for several years by guinea pig passage.

In each instance a difference will be noted. For the laboratory spotted fever strain the incubation period is only half as long; the febrile period is twice as long; almost twice as many guinea pigs show

Table 1. *Comparative observations on 20 guinea pigs infected with an* H. leporis-palustris *strain of rickettsiae and 20 guinea pigs infected with a laboratory strain of spotted fever rickettsiae*

| | Spotted fever strain | *H. leporis-palustris* strain |
|---|---|---|
| Average length in days of: | | |
| Incubation period | 3.0 | 5.5 |
| Febrile period | 8.5 | 4.0 |
| Scrotal involvement | 5.0 | 2.5 |
| Percentage of guinea pigs showing scrotal involvement | 93.0 | 56.0 |
| Average rectal temperature during febrile period | 40.6° C. | 40.0° C. |
| Percentage of guinea pigs dying as a result of the infection | 90.0 | 0 |

scrotal involvement, and the average rectal temperature during the febrile period is six-tenths of a degree higher than for the *H. leporis-palustris* strain of rickettsia. Ninety percent of the guinea pigs injected with the spotted fever strain succumbed as a result of the infection, whereas there were no fatalities with the *H. leporis-palustris* strain. An additional point not noted in the table is the difference in the type of scrotal involvement observed. With the spotted fever strain, marked swelling progressing to a dark-purplish congestion followed by necrosis and sloughing is observed. With the *H. leporis-palustris* strain, the scrotal reaction usually consists of swelling and redness only.

The *H. leporis-palustris* strains of rickettsiae have shown no increase in virulence on prolonged passage in guinea pigs. In fact, there is a tendency for them to decrease in virulence, making it difficult to maintain a guinea-pig-passage strain.

When guinea pigs which have been infected with the less virulent *H. leporis-palustris* strains are challenged with a laboratory strain of spotted fever rickettsiae, they are found to be immune. Parker (*1*) in 1923 showed that guinea pigs could have infection of such mildness with *H. leporis-palustris* strains as to be classed as "inapparent infection," yet, when subsequently challenged with a virulent strain of Rocky Mountain spotted fever rickettsia, there was complete immunity. The same results have been observed in this laboratory on several occasions since that time. The results of the most recent immunity test carried out with an *H. leporis-palustris* strain are given in table 2.

Initial injection with either the *H. leporis-palustris* strain or the laboratory strain of rickettsiae produced complete immunity against boutonneuse fever, South African tick-bite fever, and maculatum disease as well as against each other. Likewise, inoculation with these rickettsiae protected against challenge with either the *H. leporis-palustris* strain or the laboratory spotted fever strain of rickettsiae. The rickettsiae of boutonneuse fever, South African tick-bite

Table 2. *Cross-immunity tests in guinea pigs employing the* **H. leporis-palustris** *strain of rickettsia in comparison with a laboratory spotted fever strain of rickettsia*

| Rickettsiae used for the original infection | Rickettsiae used for the challenge inoculation | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | *H. l.-p.* | RMsf | Mac. | B.F. | SAtb | NQtt | RP | Epid. typh. | Murine typhus | Q fever |
| *H. l.-p.* | ------- | 0/6 | 0/6 | 0/6 | 0/6 | 6/6 | 5/5 | 3/6 | 6/6 | 6/6 |
| RMsf | 0/6 | ------- | 0/6 | 0/6 | 0/6 | 4/6 | 6/6 | 2/6 | 6/6 | 6/6 |
| Mac | 0/6 | 0/6 | | | | | | | | |
| B. F | 0/6 | 0/6 | | | | | | | | |
| SAtb | 0/6 | 0/6 | | | | | | | | |
| NQtt | 6/6 | 6/6 | | | | | | | | |
| RP | 0/5 | 6/6 | | | | | | | | |
| Epidemic typhus | 4/6 | 5/5 | | | | | | | | |
| Murine typhus | 0/4 | 6/6 | | | | | | | | |
| Q fever | 6/6 | 6/6 | | | | | | | | |

*H. l.-p.* = The group 3 strain was used.
RMsf = Rocky Mountain spotted fever, isolation from a human case.
Mac. = Maculatum disease.
B.F. = Boutonneuse fever.
SAtb = South African tick-bite fever.
NQtt = North Queensland tick typhus.
RP = Rickettsialpox.
Q fever = American, 9-Mile strain used.
Infectivity controls were employed for all material used in challenging and in making the original injection. In each instance the challenge material proved to be infectious for all the control guinea pigs.

Numerator = Number of guinea pigs showing infection.
Denominator = Number of guinea pigs challenged.

fever, and maculatum disease are most closely related antigenically to spotted fever.

Partial immunity between the spotted fever strain or the *H. leporis-palustris* strain of rickettsiae and epidemic typhus rickettsiae was noted. This is not an unusual finding. It will be noted that neither strain of rickettsiae produced much immunity against rickettsialpox and North Queensland tick-typhus. On the whole, both the *H. leporis-palustris* strain of rickettsia and laboratory strain of spotted fever rickettsia showed essentially the same spectrum of immunity.

Davis and Parker (*3*) reported failure of Rocky Mountain spotted fever vaccine to protect guinea pigs against challenge with boutonneuse fever, although Badger (*4*) had demonstrated the existence of complete cross immunity between the living rickettsiae.

The possibility of a similar relationship existing between the *H. leporis-palustris* strains of rickettsiae and spotted fever rickettsiae led us to examine the cross immunity obtained with vaccines prepared from these two strains.

Vaccines were prepared according to the usual ether-extraction procedure for manufacturing rickettsial vaccines (*5*). These vaccines were injected into guinea pigs to test their capacity to induce active immunity against a virulent laboratory strain of spotted fever rickettsia and an *H. leporis-palustris* strain of rickettsia. Data on the vaccines employed are given in table 3.

In the first test the immunizing dose of vaccine was injected subcutaneously, followed in 10 days by a challenge dose of spotted fever rickettsiae injected intraperitoneally. In this experiment the challenge material consisted of 1 ml. of a 1:100 dilution of a 10-percent

Table 3. *Quantitative data on vaccines employed in comparative immunity studies*

| Vaccine | Total nitrogen mgm/ml | Complement-fixing unit | CF units per mgm. total nitrogen |
|---|---|---|---|
| *H leporis-palustris* vaccines: | | | |
| No. 1, group 2 strain | 0.458 | 1:8 | 87.0 |
| No. 2, group 2 strain | .564 | 1:2 | 18.0 |
| No. 1, group 3 strain | .615 | 1:8 | 78.0 |
| No. 2, group 3 strain | .228 | undiluted | 22.0 |
| No. 278, group 2 strain | .482 | 1:2 | 20.8 |
| Rocky Mountain spotted fever laboratory strain vaccines: | | | |
| S-179 | .455 | 1:2 | 22.0 |
| S-180 | .460 | 1:2 | 22.0 |
| S-181 | .470 | undiluted | 11.0 |
| S-182 | .421 | 1:2 | 24.0 |
| No. 278R | .366 | 1:4 | 54.6 |

suspension of yolk sacs infected with the laboratory strain of spotted fever rickettsiae which had been kept frozen in the dry-ice chest. This amount of material constituted 100 minimal infectious doses when injected intraperitoneally into guinea pigs of the size (500 gm.) used in this experiment.

Doses of vaccine varied from 1 to 10 complement-fixing units. Almost complete protection was obtained with the laboratory strain vaccines in all doses, whereas there was some evidence that the *H. leporis-palustris* strain vaccines afforded less protection. A quantitative study employing No. 278, group 2 vaccine, and No. 278R vaccine was then set up, and both strains were used for challenge. The results of this experiment are given in table 4.

Table 4. *Comparison of the immunogenic potency of vaccines prepared from an* H. leporis-palustris *strain of rickettsia and a stock laboratory (R) strain of spotted fever rickettsia*

| Dosage of vaccine in CF units [1] 1.0 ml. vol. | *H. leporis-palustris* vaccinated guinea pigs | | R strain vaccinated guinea pigs | |
|---|---|---|---|---|
| | Challenge strain [2] | | Challenge strain | |
| | *H. l.-p.* | R | *H. l.-p.* | R |
| 10.0 | 0/5 | 0/6 | 0/6 | 0/6 |
| 7.5 | 0/5 | 0/6 | 0/6 | 0/4 |
| 5.0 | 0/5 | 0/5 | 0/5 | 0/6 |
| 2.5 | 0/3 | 2/4 | 0/6 | 0/5 |
| 1.0 | 0/5 | 0/6 | 0/6 | 0/6 |
| 0.75 | 0/5 | 2/6 | 0/4 | 0/6 |
| 0.5 | 0/6 | 0/5 | 0/6 | 0/5 |
| 0.4 | 2/6 | 1/6 | 1/6 | 0/5 |
| 0.25 | 0/5 | 0/4 | 0/6 | 0/4 |
| 0.20 | 0/6 | 3/5 | 2/5 | 1/6 |
| 0.1 | 0/5 | 4/5 | 0/5 | 0/4 |
| 0.05 | 3/6 | 5/6 | 5/6 | 3/6 |
| 0.025 | 5/6 | 4/6 | 6/6 | 4/6 |
| 0.0125 | 6/6 | 6/6 | 6/6 | 2/6 |
| 0.00625 | 6/6 | 6/6 | 5/5 | 6/6 |

[1] Guinea pigs given two subcutaneous injections of vaccine one week apart.

[2] The guinea pigs were challenged by the intraperitoneal injection of about 100 minimum infectious doses of a standardized yolk-sac suspension of rickettsiae 10 days following the final immunizing dose of vaccine. Six control guinea pigs inoculated with each challenge material developed infection although there were no deaths. Numerator=number of guinea pigs showing infection. Denominator=number of guinea pigs challenged.

The results in table 4 indicate that qualitatively these two vaccines are identical. The *H. leporis-palustris* vaccine did not protect against challenge with the R strain of spotted fever in the lower doses quite as efficiently as did the homologous vaccine.

The usual spotted fever vaccine does not give rise to complement-fixing antibodies in guinea pigs. This was likewise true with these vaccines.

In order to further determine whether fundamental differences in antigenic structure existed between *H. leporis-palustris* strains of rickettsiae and laboratory strains of spotted fever rickettsiae, sera from convalescent guinea pigs were titrated by complement fixation against suspensions of both rickettsiae. Some results of these titrations are shown in table 5.

Table 5. *Complement-fixing titer of convalescent guinea pig sera against rickettsial suspensions*

| Guinea pig injections and serum No. | Dilution of serum giving complete fixation with 2 units of: | |
|---|---|---|
| | Spotted fever rickettsial suspension | *H. l.-p.* strain rickettsial suspension |
| Group 3, *H. leporis-palustris* strain: | | |
| 2350 | 1:64 | 1:64 |
| 2355 | 1:64 | 1:128 |
| 2351 | 1:32 | 1:64 |
| 2359 | 1:256 | 1:256 |
| 2405 | 1:256 | 1:256 |
| 2473 | 1:64 | 1:64 |
| Group 2, *H. leporis-palustris* strain: 2356 | 1:64 | 1:128 |
| Suspension of ticks (*H. leporis-palustris*): | | |
| C21873 | 1:64 | 1:48 |
| C21874 | 1:64 | 1:32 |
| Pooled spotted fever guinea pig serum (286) R strain | 1:256 | 1:128 |
| Pooled spotted fever guinea pig serum (283-3) R strain | 1:64 | 1:128 |

NOTE: A Q fever rickettsial suspension was also used with these sera as a specificity control; no fixation was obtained.
The complement fixation tests are carried out at 5° C. for 18 hours.

Examination of the results in table 5 reveals that there are no consistent differences in titers whether the sera were titrated with a rickettsial suspension made with a laboratory spotted fever strain of rickettsia or an *H. leporis-palustris* strain.

Complement-fixing antigens, both soluble and rickettsial suspensions, were prepared and standardized against pooled, spotted fever convalescent guinea pig sera. No significant difference was noted between antigens prepared with the *H. leporis-palustris* strains of rickettsiae and our routine spotted fever complement-fixing antigens. Quantitative data on two lots of such antigens are given in table 6.

## Discussion

Jellison (*2*) in 1945 reported that spotted fever rickettsiae had never been recovered from any mammal in nature in the highly endemic

Table 6. *Quantitative data on complement-fixing antigens prepared with the group 3,* H. leporis-palustris *strain of rickettsia*

| | *H. l.-p.* preparation No. 232 | | *H. l.-p.* preparation No. 234 | |
|---|---|---|---|---|
| | Rickettsial suspension | Soluble antigen | Rickettsial suspension | Soluble antigen |
| Total nitrogen (mg. per ml.) | 0.083 | 0.174 | 0.045 | 0.140 |
| Complement-fixing unit [1] | 1:16 | 1:16 | 1:8 | 1:12 |
| CF units per mg. N | 964. | 457. | 888. | 430. |
| CF units per gm. of yolk-sac tissue (wet wgt.) | 26.4 | 85.5 | 19.8 | 66.1 |

[1] Determined with convalescent guinea pig sera from animals infected with a laboratory strain of spotted fever rickettsiae and from animals infected with an *H. leporis-palustris* strain of rickettsiae.

area of the western United States. He cites one instance of a probable isolation from a pocket gopher in Oklahoma which was never confirmed. Harrell (*6*) in 1949 makes a similar statement. The immense amount of work involved in the collection and inoculation of tissues of various mammals and the small chance of obtaining any information of value has kept such studies at a minimum. Instead, serological surveys of mammals collected in nature have been performed to determine the incidence of rickettsial complement-fixing antibodies.

The most recent survey conducted by this laboratory was during 1946 and 1947 in the same general area from which the materials used in this report were collected. Sera from 286 mammals were examined for complement-fixing antibodies against the rickettsiae of murine typhus fever, Q fever, and Rocky Mountain spotted fever. These sera had the following distribution: 61 cottontail rabbits (*Sylvilagus nuttallii*), 10 jackrabbits (*Lepus* spp.), 1 snowshoe rabbit (*Lepus americanus*), 46 sidestripes (*Citellus lateralis*), 81 Columbian ground squirrels (*Citellus columbianus*), 6 skunks (*Mephitis mephitis*), 8 woodchucks (*Marmota flaviventer*), 32 pine squirrels (*Tamiasciurus hudsonicus*), 3 badgers (*Taxidea taxus*), 1 weasel (*Mustela* sp.), 2 conies (*Ochotona princeps*), 2 mountain goats (*Oreamnos americanus*), 5 porcupines (*Erethizon epixanthum*), 9 beavers (*Castor canadensis*), 16 muskrats (*Ondatra zibethica*), 1 moose (*Alces americanus*), 1 bobcat (*Lynx ratus*), and 1 mountain lion (*Felis concolor*). In this group of animals, six cottontail rabbits gave a positive reaction by complement fixation for spotted fever, and one porcupine was positive for Q fever. *Dermacentor andersoni* ticks picked from one of the goats yielded a strain of Q fever and a strain of spotted fever. A strain of spotted fever rickettsiae was recovered from *D. andersoni* larvae found on one of the sidestripes.

During the 1948–1949 studies described in this report, only one of the cottontail rabbits serving as hosts to the *H. leporis-palustris* ticks from which the isolations described were made was shown to have

specific complement-fixing antibodies for spotted fever. Coincident with the studies on ticks from cottontail rabbits, 10 snowshoe rabbits were trapped and brought to the laboratory. Sera from eight of these rabbits were positive for spotted fever by complement fixation, and the *H. leporis-palustris* ticks picked from three of these snowshoe rabbits showing a positive serological reaction were shown to contain spotted fever rickettsiae. Ticks collected from the other five rabbits showing positive serology were negative for spotted fever. This indicates that rabbits other than cottontail rabbits may be of importance in this problem.

Fitzpatrick (*7*) in 1946 suggested the use of the yolk sac of the developing chick embryo for isolating Rocky Mountain spotted fever rickettsiae from blood, because her results showed the chick embryo to be more susceptible than the guinea pig to this rickettsia. Because of intercurrent infection in our guinea pigs, we were unable to make a direct comparison between the developing chick embryo and guinea pigs for isolating rickettsiae from ticks. However, by using antibiotics to eliminate contaminating bacteria, the yolk sac of the developing chick embryo proved to be a very suitable medium for the direct isolation of strains of spotted fever rickettsiae from *H. leporis-palustris*.

Strains of spotted fever rickettsiae of low virulence which behave in a manner similar to *H. leporis-palustris* strains of rickettsiae in guinea pigs have been isolated from *D. andersoni*. However, a certain number of the strains isolated from this latter tick do show the severe type of reaction in guinea pigs; this has never been observed with strains from *H. leporis-palvstris*. It could be postulated that the strains of low virulence sometimes present in *D. andersoni* were in reality *H. leporis-palustris* strains acquired by feeding on rabbits harboring infected rabbit ticks.

## Summary

The isolation is reported of seven strains of Rocky Mountain spotted fever rickettsiae from *Haemaphysalis leporis-palustris* found in nature on cottontail rabbits in the Bitter Root Valley of western Montana. Although these strains appear to be serologically and immunologically identical with a laboratory strain of Rocky Mountain spotted fever rickettsia, and infection of guinea pigs with living rickettsiae affords protection against challenge with a virulent strain of spotted fever rickettsia, they are of low virulence for guinea pigs.

## Conclusions

Although the rabbit tick, *Haemaphysalis leporis-palustris*, does not usually bite man, the finding of rickettsiae in this tick, which can be

classified as Rocky Mountain spotted fever rickettsiae, indicates that it may be of importance in maintaining spotted fever rickettsiae in nature among rabbits. The observation that all stages of *Dermacentor andersoni*, the tick most commonly involved in the transmission of the infection to man in the western United States, is also found on rabbits is of additional significance in assessing the role of the rabbit tick in maintaining this infection among a probable mammalian reservoir.

ACKNOWLEDGMENTS

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# A Rabbit-Ear Cage for Bloodsucking Arthropods

By Paul A. Woke, Sc.D.*

Various types of cages for bloodsucking arthropods, suited for long-term attachment to the animal host, are described in detail in the publications of Camin (*1*), Jellison and Philip (*2*), Rees (*3*), Sacktor et al. (*4*), and in accounts cited by these authors. The cage herein described appears to answer previously unfulfilled needs and to present desirable features not found in others.

This cage (fig. 1) is designed specifically for attachment to the heads of rabbits in such a manner as to make full use of the enclosed ears in providing for the feeding of bloodsucking arthropods. A transparent wall sloping upward and outward from the head and covered across its top by mesh material surrounds the erect ears, forming a cage elliptical in cross section and of large capacity, which permits good visibility throughout the interior and great ease in manipulations. The cage is light in weight, not easily damaged, and offers no important restriction to the normal activities of the host. It provides a high degree of security against escape of the confined arthropods, environmental conditions acceptable in a wide range of applications in culture and experimental study, and a degree of versatility unusual in such cages. A variety of sizes and shapes is obtainable and certain accommodations within the cage are possible by modifications of the basic plan.

The rabbit is a natural host to many bloodsucking arthropods and an acceptable host to others. The ears present a large, clean, easily manipulated feeding surface abundantly supplied with blood vessels. The hair is easily removed when a bared-skin surface is needed. By temperament the rabbit is well suited to this application, and several breeds are generally available. Although developed for the rabbit, the device may be adaptable to certain other animals.

## Construction

The cage is constructed largely of transparent celluloid cut from sheets 0.01 inch in thickness. The top and necessary wall openings are covered with standard silk bolting cloth, bronze or copper wire cloth, or both. Materials having 18, 28, 40, 53, 60, 65, and 92 meshes per lineal inch have served all purposes in our experience. The wire cloth and often the entire cage may be reused.

*From the Laboratory of Tropical Diseases, Microbiological Institute of the National Institutes of Health, Public Health Service, Bethesda, Md. Grateful acknowledgment is made to Paul C. Shade for valuable technical assistance in preparing the various cage modifications and in carrying out the experiments needed for the development of this cage.

Figure 1. Photograph showing celluloid rabbit-ear cage in use, with mature ticks attaching to ears preparatory to engorgement. Note the method of attachment to the rabbit's head with flexible collodion, the position of the ears in relation to the cage, the visibility afforded, and a preferred position for the wire-cloth covered opening for ventilation.

The construction and attachment of a cage may be done quite simply and satisfactorily by trial, but when numbers of cages of varied sizes and shapes are to be used, more elaborate preparations are helpful. The shaping of the celluloid for the wall is aided by the use of templates and shaping forms which may be prepared for the construction of any useful sizes by the procedures given below with reference to figure 2.

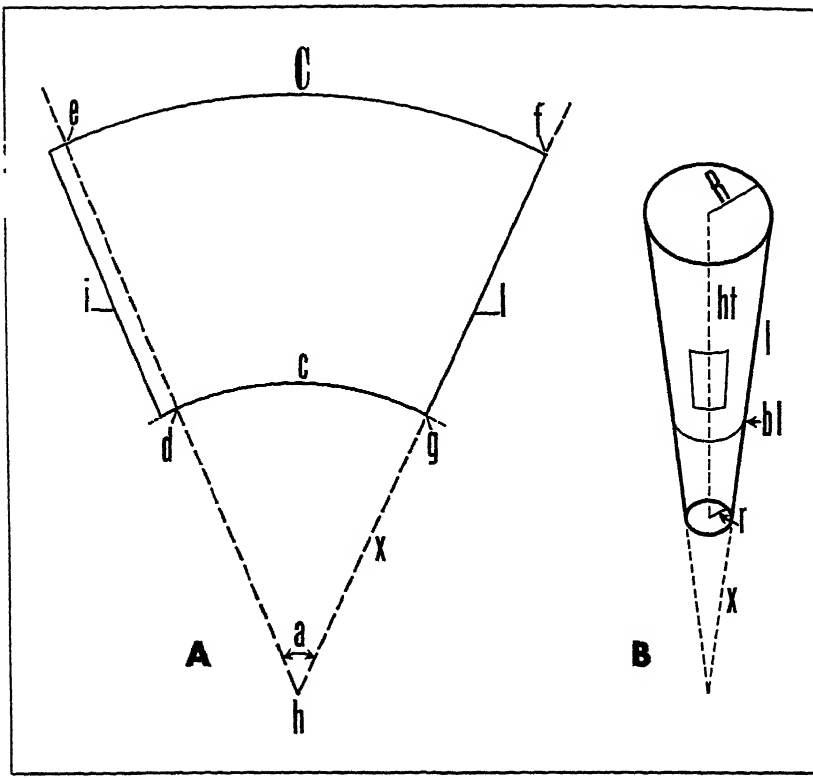


Figure 2. Diagrams illustrating methods in the preparation of the rabbit-ear cage. A. Preparation of pattern for cutting out celluloid wall; B. Preparation of form for shaping the celluloid wall.

Templates are cut from firm material such as pressed paperboard or heavy aluminum. The determining factors in preparing a pattern for a template are: (1) The width $y$ of the head which is measured by outside calipers at the widest point immediately below the bases of the ears. The cage on being prepared for attachment to the rabbit's head will be given an elliptical form in cross section, and the long axis of the ellipse at the base rim should approximately equal the measurement $y$. The short axis is taken for convenience as $\frac{2y}{3}$. Since the cage is conveniently prepared first in circular form in cross section, a required radius $r$ for the base rim is derived by the formula $r=\sqrt{\frac{y^2}{6}}$. (2) The length of the animal's ears, to which is added one-half inch to one inch for attachment of the cage and clearance below the cover, obtains required length $l$ for the sloping side of the cage. (3) The required amount of expansion for the upper part of the cage, which determines the long axis of the ellipse, $Y$. Hence, by application of the formula

$R=\sqrt{\frac{Y^2}{6}}$, the radius $R$ for the upper rim of the cage is found. (4)

Angle $a$ is obtained by application of the formula $a=\frac{360\,(R-r)}{l}$.

To lay out a pattern, lines *hf* and *he* extended (fig. 2A) are constructed on angle $a$, and the formula $x=\frac{360\,r}{a}$ is applied to obtain $x$, the radius for arc $c$. Using $x$ plus $l$ as radius, arc $C$ is constructed. The overlap $i$ is a 3/8-inch extension along arcs $c$ and $C$ beyond radial line *de*. The completed pattern is represented by the area *defg* plus overlap $i$.

The shaping form (fig. 2B) is suitably turned from a block of hard wood to the form of a frustum. A single form serves for the preparation of all cages employing the same side slope provided the diameters of the large and small ends are greater and less respectively than those of the extreme range of proposed cage sizes. Using the value for angle $a$ previously chosen for the patterns and letting $R$ and $r$ represent the radii of circles for the large end and the small end respectively of the frustum, the side length $l$ is determined by the formula $l=\frac{360\,(R-r)}{a}$.

Where feasible, the use of one cage shape reduces the number of required patterns to the minimum and the shaping forms to a single size. The table gives the radii for arcs $c$ and $C$ needed for preparing the three different sized patterns which have answered most requirements in our experience with the long-eared Albino New Zealand White breed of rabbit. The value of 47° for angle $a$ used in the making of these three patterns, originally was determined from the pattern of a suitably shaped cage formed by trial. The side length $l$ of $5\frac{1}{2}$ inches is about the minimum length usable with long-eared breeds. For short-eared rabbits approximately 1 inch may be deducted from the value given for the radius for arc $C$.

A shaping form $3\frac{1}{4}$ inches in diameter at the large end, 1 inch in diameter at the small end, and $8\frac{1}{2}$ inches in vertical height (fig. 2B, *ht*) serves for use with patterns made as above.

***Radii required for the construction of 3 patterns, showing approximate correlation with weights of rabbits, and head measurements from which derived. Length $l=5\frac{1}{2}$ inches. Angle $a=47°$***

| Approximate range in weights of rabbits (pounds) | Approximate width of head $y$ (inches) | Base rim diameter of cage (inches) | Radius for arc $c$ (inches) | Radius for arc $C$ (inches) |
|---|---|---|---|---|
| 3–4 | $1\frac{5}{8}$ | $1\frac{5}{16}$ | 5 | $10\frac{1}{2}$ |
| 4–5 | $1\frac{7}{8}$ | $1\frac{1}{2}$ | $5\frac{3}{4}$ | $11\frac{1}{4}$ |
| 5–7 | 2 | $1\frac{5}{8}$ | $6\frac{1}{4}$ | $11\frac{3}{4}$ |

The template is pressed firmly against a sheet of celluloid lying on a flat surface while a sharp, small-bladed knife is passed around its edge to cut out the piece which is to become the wall. The cut-out piece then is placed on the shaping form with its base coinciding with a predetermined marked base line (fig. 2B, *bl*) for the size cage being made. The overlap is sealed with acetone to the opposite edge and held firmly against the form for the few seconds required for setting.

Required openings are conveniently cut while the wall piece is on the form although standard openings may be cut from corresponding ones in the templates. Openings may be placed in any location. Those for ventilation serve best when placed near the base of the cage, on the front, back, or sides. The front position (fig. 1) is less subject to damage by the rabbit's claws. The corresponding positions of those that can be predetermined may be marked as guide lines on the shaping form, oriented with reference to a vertical line marking the position for the radial edge of the wall at the overlap. Shallow, narrow grooves, cut into the form, may serve as guide lines for cutting standard openings. Figure 2B shows guide lines for cutting an opening for ventilation 1 inch wide and 2 inches high, with its lower side 1 inch above the base rim of the cage. Reinforcement for those openings not to be covered by wire cloth may be provided by an extra ring of celluloid around the edges. Round openings and reinforcement rings may be neatly cut with sharp cork borers against a flat surface.

The celluloid is softened by immersion in warm water (60° C. for one minute is satisfactory) and immediately given the required elliptical shape by hand. Usually the overlap is best placed on one of the narrow sides rather than on the broad front or back.

Bolting cloth or wire cloth used to cover openings should be of the largest mesh known capable of preventing the escape of the smallest arthropods to be confined. Sections are cut with a ¼-inch margin and attached to the wall by means of an acetone solution of celluloid. Wire cloth is put on the outer side. Bolting cloth when used is put on the inner side and protected by 18-mesh wire cloth. Any needed internal fixtures, such as a harborage arrangement, are now installed.

A 1-inch strip of gauze or light cloth is attached by means of acetone around the outer side of the wall at the base, approximately ¼ inch being attached to the wall and secured by a covering strip of celluloid. The lower free portion is slit in three places, and will be used to attach the cage to the head of the rabbit. Next a ½-inch width of surgical adhesive plaster is applied around the upper rim to reinforce the celluloid wall and to cover the sharp edge which otherwise might cut through the cloth covering to be applied later.

## Attachment

The rabbit is immobilized on a board, and the hair on the head for a distance of about an inch around the base of the ears is clipped to a length of about 3/16 to 1/8 inch. Flexible collodion, used to attach the cage, is spread over the underside of the cloth and over the top and sides of the head about the base of the ears and allowed to dry partially. The cage is then lowered about the ears which are grasped through the top and moved from side to side to free the hair.

More collodion is added and the cloth spread out and pressed down. Collodion is spread over the upper side of the cloth and especially over strips of cloth laid over the slits, to give needed reinforcement. A final layer gives the "hood" a smooth surface. Drying is aided by a stream of warm, dry air. The adverse effect on the arthropods of the toxic collodion solvents is lessened by attachment of the cages approximately 24 hours before intended infestation. Secure attachment is greatly aided by proper fitting. The lower rim should fit snugly but not tightly to the bases of the ears front and back. Ample space for movement of the ears should be left between the wall and the ears on the sides. Strips of chamois may be secured between the ears and the wall to aid in producing a better fit. The need for adjustments due to growth during anticipated long-term use, may be reduced by selection of young mature animals and by looser fitting.

A bolting cloth cover of suitable mesh is attached with adhesive plaster. A 1/2-inch strip secures the gathered edges about the rim, while a covering 1-inch strip, turned over the rim for about 1/4 inch to protect the cloth, secures the cover to the wall.

Need for repairs is determined on regular daily inspections. More collodion is forced under the hood as it is raised by the growing hair.

## Use and Performance

The rabbit-ear cage, in continuous use since its origin in January 1949, has proved suitable to the requirements of the different stages of several species of bloodsucking arthropods including ticks, mites, lice, bedbugs, triatomine bugs, and fleas in biological and disease transmission experiments in which these arthropods have been fed, cultured, and subjected to observation and study. The ticks *Dermacentor andersoni*, *D. variabilis*, *Amblyomma americanum*, and *Rhipicephalus sanguineus* are fed to engorgement in all three stages by this means. In addition to routine rearing and life history studies, some of the special uses to which this cage has been put are in starting cultures from small numbers, adaptations of ectoparasites such as the human body louse and the dog flea to the rabbit as host, observations of sensitivity of the rabbit to bites of selected arthropods, and in


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photography. It should serve well for certain types of insecticide and repellent testing. Important advantages of the cage in disease transmission studies over free infestation of the body of the host are: (1) The likelihood of feeding, whether the species is well or poorly adapted to the rabbit, is increased due to proximity. (2) Feeding and activities are readily observed and timing of the feeding period is easily accomplished. (3) Recoveries are practically 100 percent. (4) The chances for escape are reduced. (5) Ingestion by the host is prevented. (6) Litter and droppings of the host may be tested for the presence of the causative organism independently of the arthropods. (7) Feces and eggs of the arthropod under test are easily collected for test.

Since the cage is not intended for mass production, the maximum numbers of the several species and stages that can be accommodated without overcrowding have not been determined. However, in our experience, up to 2,700 larvae, 250 nymphs, or 25 adult females per cage of the above-mentioned ticks have engorged satisfactorily and without apparent harm to the host. Up to 1,000 fleas, *Ctenocephalides canis*, have fed freely for as long as 6 days, and 200 fed for 2 weeks, each group producing quantities of eggs, without serious injury to the host. Six weeks after an initial infestation with 275 mature lice and an unknown number of eggs, 4,000 human body lice were supported in the cage without apparent ill effects to the lice or to the host.

Numerous adaptations of the cage by variation of size, shape, and internal arrangements are useful. Cages for single ears are useful for such applications as small cultures, two separate cultures on the same host, comparative experiments, and for close observations. For photographing or for more precise observation, cages may be closely fitted to the ear or flattened wherever desired. The ear cage can provide protection for small cages attached directly to the ear. Openings for performing operations within the cage may be placed anywhere in the celluloid wall.

Bedbugs, lice, and some mites readily seek out and use prepared harborage, thus providing an easy means for removing the arthropods and their eggs from time to time. For this purpose, pieces of corrugated paper or patches of cloth, conveniently about 1 inch by 1½ inches, may be supported in racks of perforated celluloid or of large mesh metal screen attached to the wall about ¼ inch below the top rim where they are easily collected and replaced.

Arthropods and required materials are put into the cage through an opening in the cage wall or through the top before the attachment of the cloth cover, and recovered by means of an aspirator, forceps, a plastic spoon, or by removal of harborage. For infesting, small light capsules in which eggs have hatched may be opened and dropped into the cage. The cage may be inverted over cellucotton for the removal

of detached engorged adult female ticks. Upon death of infected hosts, the ears may be severed from the head, the ear openings plugged with cotton, and the contents of the cage examined when and where convenient.

Atmospheric conditions within the cage may be closely controlled when necessary since regulated forced air circulation is practical. Gaseous stimulants and anesthetics such as carbon dioxide and ammonia may be introduced in measured amounts and removed as required.

The cage itself appears to cause little discomfort. Certain arthropods, however, may be very irritating. Host rabbits fitted with ear cages may be kept in regular animal cages and provided for in a usual manner.

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# Reported Incidence of Communicable Diseases in the United States, Fourth Quarter, 1950

This summary shows the cumulative totals of communicable disease cases taken from monthly reports submitted by the health departments of each State, Alaska, Hawaii, Panama Canal Zone, Puerto Rico, and the Virgin Islands for the fourth quarter of 1950. The figures should be regarded as provisional until final annual data are released by the States, but any changes probably will be small. Usefulness of the data is limited by the wide variation in completeness and accuracy of reporting which exist in the various States.

The table gives the reported cases of selected communicable diseases for each division and State in October, November, and December 1950. Data reported for diseases with low frequencies or by only a few States are given in the section "Additional Diseases."

*Poliomyelitis*

Approximately one-third of all cases reported in 1950 for the country as a whole were reported in the last quarter of the year. The peak week in incidence was not reached until the week ended September 23 which was later than usual. In some States nearly one-half of all cases occurring in 1950 were reported in the fourth quarter.

*Diphtheria*

The number of reported cases was much below that for the same quarter of 1949 and the 5-year median.

*Scarlet Fever and Septic Sore Throat*

The number of cases of scarlet fever showed a decrease compared with the same period last year and the 5-year median. However, there was an equivalent increase in reported cases of septic sore throat.

*Measles*

The reported incidence of measles was approximately one-third greater than for the same period of 1949, but only slightly greater than the 5-year median.

## Additional Diseases

Figures for additional diseases reported by State health departments during the fourth quarter of 1950 and not shown in the table are given below. Also included are diseases reported by the Territories and

## Reported Cases of Selected Communicable Diseases in the United States, Each Division and State, Fourth Quarter 1950

[Numbers under diseases are International List numbers. 1948 revision]

| Area | Brucellosis (044) | Chickenpox (087) | Conjunctivitis [1] (370) | Diphtheria (055) | Dysentery: Amebic (046) | Dysentery: Bacillary (045) | Dysentery: Unspecified (047, 048) |
|---|---|---|---|---|---|---|---|
| **New England** | **24** | **5,822** | **7** | **41** | **11** | **25** | |
| Maine | 2 | 1,143 | | 3 | | | |
| New Hampshire | | 188 | | 6 | | | |
| Vermont | 3 | 597 | | 1 | | | |
| Massachusetts | 5 | 2,711 | | 28 | 3 | 22 | |
| Rhode Island | 1 | 266 | | 2 | | 1 | |
| Connecticut | 13 | 917 | 7 | 1 | 8 | 2 | |
| **Middle Atlantic** | **66** | **10,980** | | **81** | **303** | **198** | **1** |
| New York | 32 | 3,498 | | 48 | 285 | 194 | |
| New Jersey | 13 | 3,879 | | 10 | 16 | 1 | 1 |
| Pennsylvania | 21 | 3,603 | | 23 | 2 | 3 | |
| **East North Central** | **195** | **14,484** | **52** | **121** | **152** | **74** | **8** |
| Ohio | 15 | 2,843 | | 47 | 4 | 7 | |
| Indiana | 13 | 608 | | 26 | 3 | 2 | |
| Illinois | 101 | 2,471 | 10 | 21 | 101 | 27 | |
| Michigan | 14 | 3,699 | 42 | 24 | 44 | 38 | (*) |
| Wisconsin | 52 | 4,863 | | 3 | | | 8 |
| **West North Central** | **168** | **3,064** | **208** | **77** | **24** | **23** | **11** |
| Minnesota | 46 | 513 | 1 | 37 | 16 | 17 | 3 |
| Iowa | 65 | 173 | 4 | 8 | 3 | 2 | |
| Missouri | 17 | 370 | | 24 | 3 | | 8 |
| North Dakota | | 202 | 190 | | | | |
| South Dakota | 7 | 89 | | 1 | (*) | (*) | (*) |
| Nebraska | 1 | 169 | | 3 | 1 | | |
| Kansas | 32 | 1,548 | 13 | 4 | 1 | 4 | |
| **South Atlantic** | **57** | **1,732** | **32** | **598** | **77** | **106** | **500** |
| Delaware | | 35 | | 2 | | | 1 |
| Maryland | 7 | 306 | | 10 | 4 | 6 | |
| District of Columbia | | 179 | | | | 4 | |
| Virginia | 19 | 434 | | 59 | 1 | | 492 |
| West Virginia | 6 | 426 | 8 | 57 | 1 | 16 | |
| North Carolina | 8 | | | 193 | 33 | 16 | |
| South Carolina | | | | 78 | 1 | 5 | |
| Georgia | 12 | 266 | 17 | 166 | 3 | 53 | 7 |
| Florida | 5 | 86 | 7 | 33 | 34 | 6 | |
| **East South Central** | **42** | **947** | **4** | **403** | **157** | **57** | **11** |
| Kentucky | 4 | 264 | 4 | 96 | 64 | 6 | 8 |
| Tennessee | 20 | 390 | | 102 | 37 | 35 | 3 |
| Alabama | 6 | 293 | | 135 | 5 | (*) | (*) |
| Mississippi | 12 | | | 70 | 51 | 16 | (*) |
| **West South Central** | **64** | **534** | | **418** | **155** | **6,265** | **5,717** |
| Arkansas | 8 | 277 | | 71 | 12 | 46 | 134 |
| Louisiana | 3 | 60 | | 28 | 55 | | (*) |
| Oklahoma | 17 | 197 | | 44 | 4 | 12 | 21 |
| Texas | 36 | | | 275 | 84 | 6,207 | 5,562 |
| **Mountain** | **28** | **2,816** | **101** | **60** | **44** | **563** | **177** |
| Montana | 4 | 300 | 12 | 13 | 3 | 1 | |
| Idaho | 6 | 256 | 57 | 7 | 1 | | |
| Wyoming | 2 | 140 | 2 | 3 | | | |
| Colorado | 7 | 813 | | 10 | 1 | 9 | |
| New Mexico | | 178 | | 6 | 5 | 26 | 12 |
| Arizona | 5 | 360 | 4 | 16 | 30 | 527 | 164 |
| Utah | 1 | 689 | | 4 | 4 | | |
| Nevada | 3 | 80 | 26 | 1 | | | 1 |
| **Pacific** | **35** | **5,106** | **28** | **75** | **138** | **169** | **37** |
| Washington | 2 | | | 6 | 1 | 8 | 32 |
| Oregon | 5 | | 28 | 16 | 36 | 1 | 5 |
| California | 28 | 5,106 | | 53 | 101 | 160 | (*) |
| Fourth quarter 1950 | 679 | 45,485 | 432 | 1,874 | 1,061 | 7,480 | 6,462 |
| Fourth quarter 1949 | 827 | 50,105 | 357 | 2,858 | 1,304 | 7,032 | 6,677 |
| Median 1945–49 | 1,262 | 50,129 | 322 | 4,359 | 945 | 5,898 | 2,143 |
| Alaska | | 140 | 1 | | | | 8 |
| Hawaii | 1 | 137 | 11 | 2 | 2 | 12 | |
| Panama Canal Zone [2] | 1 | 43 | | 5 | 27 | 13 | |
| Puerto Rico [3] | | 50 | | 128 | | | 5 |
| Virgin Islands [4] | | 1 | | | | | |

*Reported not notifiable.
[1] For reported cases of "Ophthalmia neonatorum" see the section following tables.
[2] Covers September, October, and November.
[3] From weekly reports.
[4] Includes September.

## Reported Cases of Selected Communicable Diseases in the United States, Each Division and State, Fourth Quarter 1950—Continued

[Numbers under diseases are International List numbers, 1948 revision]

| Area | Encephalitis, acute infectious (082) | German measles (086) | Hookworm disease (129) | Influenza (480–483) | Malaria (110–117) | Measles (085) | Meningitis, meningococcal (057.0) |
|---|---|---|---|---|---|---|---|
| **New England** | **16** | **434** | **2** | **29** | **1** | **1,083** | **40** |
| Maine | | 67 | | 6 | | 36 | 9 |
| New Hampshire | | 14 | | 15 | | 88 | 2 |
| Vermont | 1 | 34 | | | | 283 | 1 |
| Massachusetts | 14 | 238 | | (*) | 1 | 481 | 19 |
| Rhode Island | | 1 | | 2 | | 53 | 2 |
| Connecticut | 1 | 80 | 2 | 6 | | 142 | 7 |
| **Middle Atlantic** | **45** | **620** | **31** | **75** | **1** | **5,057** | **178** |
| New York | 40 | 252 | 31 | [1] 24 | 1 | 1,612 | 93 |
| New Jersey | 4 | 205 | | 30 | | 1,065 | 15 |
| Pennsylvania | 1 | 163 | | 21 | | 2,380 | 70 |
| **East North Central** | **41** | **746** | | **436** | **2** | **8,225** | **158** |
| Ohio | 1 | 103 | | 33 | 1 | 1,960 | 52 |
| Indiana | 8 | 17 | | 56 | | 143 | 3 |
| Illinois | 11 | 106 | | 12 | | 1,908 | 54 |
| Michigan | 15 | 252 | | 15 | | 969 | 31 |
| Wisconsin | 6 | 268 | | 320 | 1 | 3,245 | 18 |
| **West North Central** | **21** | **37** | | **259** | **2** | **2,419** | **71** |
| Minnesota | 1 | | | 3 | 1 | 325 | 8 |
| Iowa | 6 | | | | | 53 | 9 |
| Missouri | 3 | 29 | | 25 | 1 | 1,116 | 23 |
| North Dakota | 5 | | | 34 | | 113 | 4 |
| South Dakota | 5 | | | | | 63 | 3 |
| Nebraska | | | | 180 | | 22 | 8 |
| Kansas | 1 | 8 | | 17 | | 727 | 16 |
| **South Atlantic** | **13** | **33** | **3,323** | **5,066** | **26** | **1,480** | **117** |
| Delaware | | | | | | 36 | 3 |
| Maryland | 1 | 23 | | 12 | 1 | 40 | 9 |
| District of Columbia | 1 | | | 9 | | 42 | 1 |
| Virginia | 2 | | | 3,271 | 4 | 407 | 26 |
| West Virginia | 1 | 1 | | 1,150 | | 338 | 12 |
| North Carolina | 1 | | | | 4 | 288 | 29 |
| South Carolina | | | | 338 | 5 | 29 | 10 |
| Georgia | 3 | | | 255 | 11 | 254 | 15 |
| Florida | 4 | 9 | 3,323 | 31 | 1 | 46 | 12 |
| **East South Central** | **19** | **33** | **895** | **576** | **22** | **1,075** | **91** |
| Kentucky | 2 | 8 | 106 | 46 | | 622 | 25 |
| Tennessee | 9 | 22 | 2 | 260 | 2 | 231 | 42 |
| Alabama | 1 | 3 | | 231 | 15 | 35 | 12 |
| Mississippi | 7 | | 787 | 39 | 5 | 187 | 12 |
| **West South Central** | **24** | **31** | **261** | **21,996** | **218** | **2,268** | **91** |
| Arkansas | 6 | 5 | 8 | 1,583 | 2 | 388 | 7 |
| Louisiana | 1 | | 239 | 7 | 1 | 112 | 6 |
| Oklahoma | 4 | 26 | 14 | 991 | 18 | 235 | 10 |
| Texas | 13 | | | 19,415 | 197 | 1,533 | 68 |
| **Mountain** | **10** | **296** | | **2,309** | **9** | **2,369** | **21** |
| Montana | | 39 | | 133 | | 64 | |
| Idaho | 2 | 69 | | 175 | | 337 | 2 |
| Wyoming | 1 | 45 | | | | 130 | 4 |
| Colorado | 2 | 52 | | 219 | 2 | 1,284 | 9 |
| New Mexico | 1 | 5 | | 3 | | 144 | 1 |
| Arizona | 4 | 55 | | 1,622 | 5 | 120 | 3 |
| Utah | | 31 | | 9 | | 217 | 2 |
| Nevada | | | | 148 | 2 | 73 | |
| **Pacific** | **140** | **611** | **1** | **204** | **4** | **3,587** | **82** |
| Washington | 5 | | | 29 | | 1,132 | 24 |
| Oregon | | | 1 | 93 | | 168 | 10 |
| California | 135 | 611 | | 82 | 4 | 2,287 | 48 |
| Fourth quarter 1950 | 329 | 2,841 | 4,513 | 30,950 | 285 | 27,563 | 849 |
| Fourth quarter 1949 | 191 | 2,483 | 4,302 | 8,434 | 627 | 18,179 | 837 |
| Median 1945–49 | 145 | 2,483 | 4,061 | 32,724 | 2,893 | 25,449 | 837 |
| Alaska | | 6 | | 42 | | 10 | 5 |
| Hawaii | | 19 | | 1,287 | 1 | 24 | 1 |
| Panama Canal Zone [2] | | 1 | | 6 | 46 | 70 | 3 |
| Puerto Rico [3] | | | | 215 | 18 | 986 | |
| Virgin Islands [4] | | | | | | | |

*Reported not notifiable.
[1] New York City only.
[2] Covers September, October, and November.
[3] From weekly reports.
[4] Includes also September.

## Reported Cases of Selected Communicable Diseases in the United States, Each Division and State, Fourth Quarter 1950—Continued

[Numbers under diseases are International List numbers, 1948 revision]

| Area | Mumps (089) | Pneumonia (490–493) | Poliomyelitis: Total (080.0–080.3) | Poliomyelitis: Paralytic (080.0–080.1) | Poliomyelitis: Nonparalytic (080.2) | Poliomyelitis: Unspecified (080.3) | Rheumatic fever (400–402) |
|---|---|---|---|---|---|---|---|
| **New England** | **2,840** | **566** | **439** | **175** | **106** | **158** | **31** |
| Maine | 169 | 117 | 31 | 22 | 8 | 1 | 4 |
| New Hampshire | 85 | 1 | 9 | --- | --- | 9 | --- |
| Vermont | 471 | 11 | 8 | --- | --- | 8 | --- |
| Massachusetts | 1,710 | (*) | 200 | 109 | 71 | 20 | (*) |
| Rhode Island | 10 | 13 | 13 | --- | --- | 13 | 27 |
| Connecticut | 395 | 424 | 178 | 44 | 27 | 107 | (*) |
| **Middle Atlantic** | **7,063** | **3,954** | **2,346** | --- | --- | **2,346** | **135** |
| New York | 1,791 | 2,715 | 1,567 | --- | --- | 1,567 | (*) |
| New Jersey | 2,811 | 616 | 283 | --- | --- | 283 | (*) |
| Pennsylvania | 2,461 | 623 | 496 | --- | --- | 496 | 135 |
| **East North Central** | **7,253** | **1,444** | **3,140** | **883** | **666** | **1,591** | **175** |
| Ohio | 924 | (*) | 818 | --- | --- | 818 | 14 |
| Indiana | 231 | 178 | 297 | 91 | 33 | 173 | 2 |
| Illinois | 757 | 686 | 708 | 394 | 276 | 38 | 31 |
| Michigan | 2,370 | 440 | 942 | 398 | 357 | 187 | 128 |
| Wisconsin | 2,971 | 140 | 375 | --- | --- | 375 | --- |
| **West North Central** | **988** | **2,485** | **1,267** | **152** | **70** | **1,045** | **41** |
| Minnesota | 6 | 1,431 | 245 | 138 | 65 | 42 | 38 |
| Iowa | 270 | 29 | 451 | --- | --- | 451 | 1 |
| Missouri | 173 | 153 | 154 | --- | --- | 154 | --- |
| North Dakota | --- | 702 | 9 | --- | --- | 9 | 2 |
| South Dakota | 43 | 3 | 84 | --- | --- | 84 | (*) |
| Nebraska | 247 | 48 | 157 | --- | --- | 157 | (*) |
| Kansas | 249 | 119 | 167 | 14 | 5 | 148 | --- |
| **South Atlantic** | **1,325** | **2,057** | **1,443** | **432** | **110** | **901** | **77** |
| Delaware | 35 | 4 | 10 | --- | --- | 10 | --- |
| Maryland | 394 | 255 | 282 | 201 | 81 | --- | 13 |
| District of Columbia | 63 | 132 | 37 | 18 | 19 | --- | 1 |
| Virginia | 266 | 623 | 318 | --- | --- | 318 | 34 |
| West Virginia | 259 | 129 | 121 | --- | --- | 121 | 5 |
| North Carolina | --- | --- | 202 | --- | --- | 202 | --- |
| South Carolina | --- | 135 | 77 | --- | --- | 77 | 7 |
| Georgia | 124 | 595 | 201 | 192 | 9 | --- | 17 |
| Florida | 184 | 184 | 195 | 21 | 1 | 173 | (*) |
| **East South Central** | **390** | **1,334** | **509** | **389** | **20** | **100** | **99** |
| Kentucky | 204 | 386 | 190 | 151 | 7 | 32 | 7 |
| Tennessee | 95 | 411 | 151 | 151 | (*) | (*) | 20 |
| Alabama | 91 | 290 | 56 | --- | --- | 56 | 58 |
| Mississippi | --- | 247 | 112 | 87 | 13 | 12 | 14 |
| **West South Central** | **580** | **3,921** | **766** | **94** | **92** | **580** | **19** |
| Arkansas | 274 | 396 | 81 | 17 | 53 | 11 | 3 |
| Louisiana | 14 | 148 | 109 | 71 | 38 | (*) | 6 |
| Oklahoma | 292 | 220 | 103 | 6 | 1 | 96 | 10 |
| Texas | --- | 3,157 | 473 | (*) | (*) | 473 | (*) |
| **Mountain** | **2,543** | **656** | **331** | **119** | **26** | **186** | **63** |
| Montana | 205 | 17 | 18 | 6 | 3 | 9 | 1 |
| Idaho | 224 | 83 | 54 | --- | --- | 54 | 9 |
| Wyoming | 102 | 8 | 9 | 6 | 1 | 2 | 2 |
| Colorado | 385 | 228 | 86 | 67 | 10 | 9 | 16 |
| New Mexico | 147 | 75 | 60 | 40 | 12 | 8 | 7 |
| Arizona | 332 | 223 | 71 | --- | --- | 71 | 25 |
| Utah | 1,081 | 7 | 33 | --- | --- | 33 | 3 |
| Nevada | 67 | 15 | --- | --- | --- | --- | --- |
| **Pacific** | **3,241** | **780** | **1,422** | **540** | **133** | **749** | **128** |
| Washington | --- | 166 | 286 | 32 | --- | 254 | 43 |
| Oregon | --- | 149 | 247 | 171 | 39 | 37 | 15 |
| California | 3,241 | 465 | 889 | 337 | 94 | 458 | 70 |
| Fourth quarter 1950 | 26,223 | 17,197 | 11,663 | 2,784 | 1,223 | 7,656 | 768 |
| Fourth quarter 1949 | 30,376 | 18,098 | 9,551 | 1,937 | 793 | 6,821 | 786 |
| Median 1945–49 | 25,261 | 18,098 | 6,505 | ([1]) | ([1]) | ([1]) | 1,021 |
| Alaska | 71 | 19 | 158 | --- | --- | 58 | 12 |
| Hawaii | 30 | 8 | 8 | 8 | --- | --- | 13 |
| Panama Canal Zone [2] | 375 | 138 | 45 | --- | --- | 45 | --- |
| Puerto Rico [3] | --- | --- | 3 | --- | --- | 3 | --- |
| Virgin Islands [4] | --- | --- | --- | --- | --- | --- | --- |

*Reported not notifiable.
[1] Not available.
[2] Covers September, October, and November.
[3] From weekly reports.
[4] Includes also September.

## Reported Cases of Selected Communicable Diseases in the United States, Each Division and State, Fourth Quarter, 1950—Continued

[Numbers under diseases are International List numbers, 1948 revision]

| Area | Rocky Mountain spotted fever (104) | Scarlet fever (050) | Septic sore throat (051) | Smallpox (084) | Tetanus (061) | Trachoma (095) | Trichiniasis (128) |
|---|---|---|---|---|---|---|---|
| **New England** | | **1,256** | **86** | | **4** | | **20** |
| Maine | | 141 | 13 | | | | |
| New Hampshire | | [1] 77 | (1) | | | | |
| Vermont | | 46 | | | | | |
| Massachusetts | | 827 | 26 | | 1 | | 12 |
| Rhode Island | | 31 | 2 | | | | 3 |
| Connecticut | | 134 | 45 | | 3 | | 5 |
| **Middle Atlantic** | **3** | **1,753** | **16** | | **7** | | **27** |
| New York | 2 | [1] 899 | (1) | | 5 | | 22 |
| New Jersey | | 243 | 16 | | 1 | | 4 |
| Pennsylvania | 1 | 611 | | | 1 | | 1 |
| **East North Central** | **1** | **3,386** | **89** | **1** | **15** | **2** | **4** |
| Ohio | 1 | 1,151 | 2 | 1 | 2 | | 3 |
| Indiana | | 253 | 1 | | 3 | | |
| Illinois | | 502 | 17 | | 6 | | 1 |
| Michigan | | 1,162 | 55 | | 4 | | |
| Wisconsin | | 318 | 14 | | | 2 | |
| **West North Central** | | **762** | **84** | **7** | **9** | **304** | **1** |
| Minnesota | | 150 | 76 | | 2 | | 1 |
| Iowa | | 118 | | | 1 | | |
| Missouri | | 162 | 3 | 1 | 1 | 304 | |
| North Dakota | | 31 | 3 | 1 | 1 | | |
| South Dakota | | 13 | | | 1 | | |
| Nebraska | | [1] 83 | (1) | 5 | | | |
| Kansas | | 205 | 2 | | 3 | | |
| **South Atlantic** | **24** | **1,968** | **829** | | **31** | **26** | **1** |
| Delaware | | 27 | | | | | |
| Maryland | 3 | 114 | 2 | | 3 | | 1 |
| District of Columbia | | 82 | | | | | |
| Virginia | 12 | 293 | 632 | | 3 | | |
| West Virginia | 1 | 161 | 69 | | | 26 | |
| North Carolina | 4 | 896 | 8 | | | | |
| South Carolina | | 88 | 12 | | 1 | | |
| Georgia | 4 | 229 | 79 | | 14 | | |
| Florida | | 78 | 27 | | 10 | | (*) |
| **East South Central** | **4** | **1,391** | **71** | **5** | **33** | **2** | **1** |
| Kentucky | | 382 | 22 | 4 | 1 | 1 | |
| Tennessee | | 669 | 49 | 1 | 12 | 1 | 1 |
| Alabama | 2 | 244 | (*) | | 10 | | (*) |
| Mississippi | 2 | 96 | (*) | | 10 | | (*) |
| **West South Central** | **2** | **742** | **2,586** | | **13** | **59** | |
| Arkansas | 1 | 63 | 500 | | 2 | 29 | |
| Louisiana | | 62 | 1 | | 11 | | |
| Oklahoma | 1 | 144 | 66 | | | 11 | |
| Texas | | 473 | 2,019 | | (*) | 19 | (*) |
| **Mountain** | | **522** | **1,076** | | **2** | **179** | |
| Montana | | 70 | 25 | | | 74 | |
| Idaho | | 79 | 103 | | 2 | | |
| Wyoming | | 5 | | | | | |
| Colorado | | 109 | 44 | | | | |
| New Mexico | | 31 | 2 | | | 3 | |
| Arizona | | 52 | 643 | | | 99 | |
| Utah | | 172 | 4 | | | | |
| Nevada | | 4 | 255 | | | 3 | |
| **Pacific** | **1** | **1,980** | **204** | | **9** | **4** | **19** |
| Washington | | 583 | 23 | | | | 13 |
| Oregon | 1 | 179 | 67 | | 1 | 3 | |
| California | | 1,218 | 114 | | 8 | 1 | 6 |
| Fourth quarter 1950 | 35 | 13,760 | 5,041 | 13 | 123 | 576 | 73 |
| Fourth quarter 1949 | 31 | 14,510 | 3,830 | 5 | 123 | 255 | 69 |
| Median 1945–49 | 35 | 19,522 | 3,830 | 20 | 123 | 348 | 77 |
| Alaska | | 1 | 4 | | | | |
| Hawaii | | 18 | | | 2 | | |
| Panama Canal Zone [2] | | | | | 3 | | |
| Puerto Rico [3] | | | | | 28 | | |
| Virgin Islands [4] | | | | | | | |

*Reported not notifiable. [1] Cases reported as septic sore throat included with scarlet fever. [2] Covers September, October, and November. [3] From weekly reports. [4] Includes also September.

## Reported Cases of Selected Communicable Diseases in the United States, Each Division and State, Fourth Quarter 1950—Continued

[Numbers under diseases are International List numbers, 1918 revision]

| Area | Tuberculosis | | Tularemia | Typhoid fever | Paratyphoid fever [1] | Typhus fever, endemic | Whooping cough |
|---|---|---|---|---|---|---|---|
| | All forms | Respiratory | | | | | |
| | (001–019) | (001–008) | (059) | (040) | (041) | (101) | (056) |
| **New England** | **1,284** | **1,140** | | **15** | **18** | | **3,434** |
| Maine | 108 | 91 | | 6 | 1 | | 579 |
| New Hampshire | 61 | | | 3 | 1 | | 90 |
| Vermont | 74 | 74 | | | | | 768 |
| Massachusetts | 619 | 587 | | 4 | 8 | | 1,053 |
| Rhode Island | 131 | 118 | | 1 | 1 | | 495 |
| Connecticut | 291 | 270 | | 1 | 7 | | 449 |
| **Middle Atlantic** | **5,068** | **2,907** | **8** | **75** | **38** | | **3,671** |
| New York | 3,213 | 2,907 | 1 | 22 | 30 | | 1,453 |
| New Jersey | 729 | | 1 | 7 | 2 | | 1,271 |
| Pennsylvania | 1,126 | | 6 | 46 | 6 | | 947 |
| **East North Central** | **4,372** | **2,245** | **41** | **88** | **45** | | **4,896** |
| Ohio | | | 4 | 43 | 1 | | 941 |
| Indiana | 472 | 443 | 12 | 10 | 3 | | 484 |
| Illinois | 1,925 | 1,802 | 21 | 19 | 1 | | 460 |
| Michigan | 1,769 | (*) | 3 | 13 | 40 | | 1,559 |
| Wisconsin | 206 | | 1 | 3 | | | 1,452 |
| **West North Central** | **1,665** | **220** | **8** | **35** | **7** | | **1,394** |
| Minnesota | 520 | | | | 2 | | 199 |
| Iowa | 231 | | | 3 | | | 265 |
| Missouri | 565 | | 8 | 22 | 2 | | 197 |
| North Dakota | 67 | 64 | | 1 | 1 | | 131 |
| South Dakota | 53 | | | | | | 31 |
| Nebraska | 70 | | | 2 | 1 | | 104 |
| Kansas | 159 | 156 | | 7 | 1 | | 467 |
| **South Atlantic** | **4,401** | **3,470** | **32** | **107** | **24** | **51** | **2,490** |
| Delaware | 74 | 74 | | 7 | 1 | | 50 |
| Maryland | 639 | 611 | 3 | 10 | 1 | | 284 |
| District of Columbia | 406 | 383 | | 3 | 1 | | 59 |
| Virginia | 819 | 798 | 11 | 18 | 2 | 2 | 737 |
| West Virginia | 474 | 152 | 1 | 17 | | | 369 |
| North Carolina | 804 | 776 | 6 | 10 | 1 | 3 | 577 |
| South Carolina | | | | 10 | | 8 | 75 |
| Georgia | 694 | 676 | 9 | 25 | 13 | 32 | 189 |
| Florida | 491 | | 2 | 7 | 5 | 6 | 150 |
| **East South Central** | **3,027** | **935** | **25** | **63** | **6** | **15** | **899** |
| Kentucky | 702 | 676 | 4 | 8 | 1 | | 277 |
| Tennessee | 893 | (*) | 11 | 30 | 2 | 2 | 285 |
| Alabama | 1,166 | (*) | 2 | 8 | 3 | 11 | 277 |
| Mississippi | 266 | 259 | 11 | 17 | | 2 | 60 |
| **West South Central** | **2,671** | **1,532** | **36** | **120** | **19** | **44** | **2,549** |
| Arkansas | 615 | 611 | 15 | 23 | | | 377 |
| Louisiana | 530 | 514 | 5 | 26 | 6 | 9 | 87 |
| Oklahoma | 409 | 407 | 8 | 11 | 4 | | 122 |
| Texas | 1,117 | (*) | 8 | 60 | 9 | 35 | 1,963 |
| **Mountain** | **1,425** | **889** | **17** | **46** | **10** | **1** | **1,350** |
| Montana | 102 | 100 | 5 | 2 | | 1 | 241 |
| Idaho | 23 | | | 5 | 6 | | 86 |
| Wyoming | 17 | 12 | 2 | 2 | | | 35 |
| Colorado | 453 | | 1 | 3 | 1 | | 200 |
| New Mexico | 150 | 137 | | 23 | | | 191 |
| Arizona | 615 | 609 | | 9 | | | 482 |
| Utah | 31 | 31 | 8 | 1 | 2 | | 93 |
| Nevada | 34 | | 1 | 1 | 1 | | 22 |
| **Pacific** | **2,945** | **2,376** | **1** | **31** | **78** | **4** | **1,069** |
| Washington | 457 | | | 7 | 18 | | 287 |
| Oregon | 146 | 134 | 1 | 5 | | | 112 |
| California | 2,342 | 2,242 | | 19 | 60 | 4 | 670 |
| Fourth quarter 1950 | 26,858 | 15,714 | 171 | 580 | 245 | 115 | 21,752 |
| Fourth quarter 1949 | 27,532 | 15,903 | 260 | 574 | 335 | 237 | 22,230 |
| Median 1945–49 | 29,976 | 12,272 | 260 | 710 | 273 | 332 | 26,205 |
| Alaska | | | | 3 | | | 41 |
| Hawaii | 105 | | | | | 4 | 11 |
| Panama Canal Zone [2] | 198 | 152 | | 1 | 2 | | 19 |
| Puerto Rico [3] | 946 | | | 17 | | 7 | 158 |
| Virgin Islands [4] | 4 | 4 | | | | | 120 |

*Reported not notified separately.
[1] Includes salmonellosis.
[2] Covers September, October, and November.
[3] From weekly reports.
[4] Includes also September.

possessions. Figures for the Panama Canal Zone are for September to November; Puerto Rico (from weekly reports); and Virgin Islands for September to December. The numbers in parentheses are from the Manual of the International Statistical Classification of Diseases, Injuries, and Causes of Death, World Health Organization, 1948.

Actinomycosis (132): Connecticut 1, Georgia 3, Iowa 2, Michigan 1, Minnesota 3, South Dakota 1, Tennessee 1.

Anthrax (062): California 1, Massachusetts 1, New Hampshire 4, New Jersey 2, Pennsylvania 8.

Botulism (049.1): California 4, Minnesota 1, New Mexico 1, Tennessee 1.

Cancer (140–205): Alabama 1,122, Arkansas 113, Colorado 658, Florida 1,090, Georgia 58, Idaho 151, Kansas 1,660, Louisiana 694, Montana 341, Nevada 15, New Mexico 173, North Dakota 187, Pennsylvania 2,129, South Carolina 64, Tennessee 812, Utah 56, Wyoming 130, Alaska 2, Virgin Islands 4.

Coccidioidomycosis (133): Arizona 69, Oklahoma 1, Oregon 16.

Dengue (090): Texas 1.

Diarrhea of the newborn (764): California 67, Florida 5, Illinois 67, Iowa 2, Maryland 5, Minnesota 1, New Mexico 13, New York 7, Ohio 28, Oklahoma 2, Pennsylvania 6, Rhode Island 5, Washington 1.

Diarrhea, unspecified (571): Florida 23, Kentucky 34, Maryland 6, Michgian 21, Minnesota 11, Montana 36, New Mexico 62, New York 42, Ohio 285, Rhode Island 14, South Carolina 11, Wyoming 93, Alaska 68.

Encephalitis, myelitis, and encephalomyelitis, except acute infectious (343): Colorado 2, Missouri 1, Montana 2, North Carolina 2, Ohio 4, Washington 3.

Erysipelas (052): Arkansas 1, Colorado 1, Connecticut 4, Florida 4, Idaho 5, Illinois 20, Indiana 4, Kentucky 3, Louisiana 3, Maryland 1, Michigan 17, Missouri 2, Oregon 5, Pennsylvania 9, Tennessee 7, Vermont 1, Wisconsin 6, Alaska 1.

Favus (131 part): Missouri 1, Nevada 1.

Food poisoning (049): California 155, Connecticut 3, Florida 6, Illinois 41, Indiana 33, Kentucky 2, Minnesota 20, Nevada 135, New Jersey 5, New Mexico 129, New York 445, Ohio 19, Oklahoma 33, Oregon 7, Pennsylvania 43, Alaska 2, Panama Canal Zone 5.

Glandular fever—infectious mononucleosis (093): Arizona 18, Connecticut 41, Idaho 6, Kentucky 8, Maryland 5, Michigan 43, Minnesota 113, Montana 1, Nebraska 40, Ohio 1, Pennsylvania 3, Tennessee 10, Washington 28, Alaska 1.

Hepatitis, infectious (092): Connecticut 5, Idaho 3, Illinois 11, Indiana 8, Maine 6, Massachusetts 8, Michigan 32, Minnesota 3, Montana 2, Nevada 2, New York 50, Oregon 36, Pennsylvania 202, Utah 8, Washington 12, Wyoming 6, Alaska 1, Hawaii 1, Panama Canal Zone 29.

Impetigo (695, 766): Colorado 11, Idaho 31, Illinois 4, Indiana 14, Iowa 2, Kansas 4, Kentucky 47, Michigan 378, Missouri 24, Montana 10, Nevada 36, New York 37, Ohio 11, Wyoming 1, Alaska 1, Hawaii 65.

Leprosy (060): California 5, Connecticut 1, Florida 1, Louisiana 1, Missouri 1, Oregon 1, Texas 1, Alaska 2, Hawaii 2.

Meningitis, except meningococcal and tuberculous (340): Colorado 4, Idaho 2, Illinois 41, Indiana 18, Iowa 6, Kentucky 7, Maryland 6, Massachusetts 36, Michigan 10, Minnesota 17, Mississippi 15, Missouri 3, Montana 3, New Mexico 2, New York 42, Ohio 28, Rhode Island 7, Washington 22, Wyoming 1.

Ophthalmia neonatorum (033, 765) for cases of "Conjunctivitis" see table: Arizona 1, Arkansas 1, California 3, Connecticut 1, Florida 6, Georgia 1, Illinois 13, Massachusetts 38, Michigan 5, Mississippi 5, New Jersey 1, New Mexico 2,

New York 5, Ohio 100, Pennsylvania 2, South Carolina 1, Tennessee 4, Texas 16, Wisconsin 1.

Pellagra (281): Alabama 8, Arizona 1, Arkansas 1, Georgia 17, New Mexico 1, Tennessee 11.

Psittacosis (096.2): California 4, Massachusetts 1.

Rabies (094): Missouri 1, North Carolina 2.

Relapsing fever (071): Nevada 4, Texas 6.

Rickettsialpox (108): New York City 22.

Ringworm of the scalp (131, part): Arkansas 1, Connecticut 31, Florida 2, Georgia 35, Illinois 305, Indiana 96, Iowa 135, Kansas 55, Kentucky 35, Maryland 1, Minnesota 13, Missouri 29, Nevada 17, Oklahoma 12, Oregon 52, South Carolina 6, Utah 12, Virginia 104, Washington 336.

Scabies (135): Idaho 21, Indiana 14, Kansas 8, Kentucky 112, Maryland 4, Michigan 224, Missouri 15, Montana 4, Nevada 24, North Dakota 10, Pennsylvania 31, Alaska 3.

Shistosomiasis (123): New York 20.

Vincent's infection (070): Colorado 22, Florida 23, Georgia 34, Idaho 12, Illinois 26, Indiana 2, Kansas 18, Kentucky 8, Maryland 2, Montana 1, Nevada 16, New Hampshire 1, Oklahoma 31, South Dakota 3, Tennessee 30, Alaska 1.

Weil's disease (072): Massachusetts 1, Michigan 1, Hawaii 1.

*       *       *       *       *       *       *

Rabies in animals: Alabama 43, Arizona 1, Arkansas 28, California 24, Colorado 2, Florida 2, Georgia 61, Illinois 15, Indiana 106, Iowa 68, Kansas 5, Kentucky 113, Michigan 61, Minnesota 13, Mississippi 15, New York 251, Ohio 44, Oklahoma 14, Oregon 1, Pennsylvania 15, South Carolina 83, Tennessee 57, Texas 326, Virginia 14, West Virginia 17, Wisconsin 2.

# Incidence of Disease

*No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring*

## UNITED STATES

### Reports From States for Week Ended March 24, 1951

*Influenza*

In collaboration with the Influenza Information Center, National Institutes of Health, the following report on influenza has been prepared.

A substantial decrease in reported cases of influenza was reported for the current week, 12,699 cases compared with 16,290 for the previous week. The cumulative total for the first 12 weeks of 1951 is 81,216 compared with 92,515 for the same period of 1950. The number of deaths from all causes for the current week in large cities was over the 3-year median only in the Pacific region. In that area the number for the current week was 23.3 percent over the median.

Dr. Thomas Francis, Jr., Director of the Regional Laboratory at the University of Michigan, reports that there has been an extensive prevalence of influenza throughout the Ann Arbor area. A-prime influenza virus has been isolated there and from several nearby communities. One strain of influenza C virus also has been isolated, and serologic tests of the patient's sera were positive for this strain.

Dr. Harry M. Rose of Columbia University, New York City, reports the isolation of six strains of influenza virus from patients whose onsets were between February 8 and 23, 1951. All six strains may be classified in the A-prime group, but some differences exist among them.

Dr. S. F. Kalter of the collaborating laboratory at Syracuse University, reports the isolation of four strains of influenza virus from throat washings during the current outbreak. Three of these appear to be identical and related to the FM–1 strain of the A-prime type, and hemagglutination inhibition tests on paired sera from the patients indicate significant antibody increases to the FM–1 strain. The fourth strain appears to be type B, and paired sera from this patient showed a fourfold increase to his own strain, a sixteenfold increase to the Lee strain, and a fourfold increase to the FM–1 strain by hemagglutination inhibition tests.

The Surgeon General's Office of the Army reports that the Second Army Medical Laboratory had found four of six paired sera from Fort Eustis, Va., positive by the hemagglutination inhibition test for influenza virus types A and A-prime. The onsets of illness were

between February 15 and 28. Of two paired serum specimens from Camp Holabird, one was positive with type A-prime. One paired serum specimen from Aberdeen Proving Ground, Md., was also positive with type A-prime.

Dr. A. A. Jenkins, Utah State Department of Health, reports that for the week ended March 9, 265 cases of influenza were reported in Davis County (population, 30,000). Sore throat, muscular pains, and fever were frequent symptoms. Paired serum specimens are being obtained for examination at the State University School of Medicine. Unofficial reports of a similar type of disease in other parts of the State were also received, suggesting widespread prevalence in the State.

An estimation of the prevalence of the influenzalike illness in the San Joaquin Local Health District in California was determined by a questionnaire sent to physicians. About one-half of the families in the area were involved, and within family groups 50 to 75 percent were afflicted. From this information it was estimated that one-third of the population in San Joaquin County had an influenzalike illness. The Regional Laboratory at Berkeley, Calif., reports that of 109 paired sera tested in the week of March 10 to 16, 51 showed a rise in complement-fixing titer for influenza A. One paired sera showed a significant rise in titer for type B in the complement fixation test.

### *Measles*

There was a slight decrease in the number of cases reported for the current week (17,575) as compared with the previous week (17,914). The cumulative total for the first 12 weeks of 1951 is 156,945 compared with 86,141 for the same period last year.

## Epidemiological Reports

### *Rabies*

The Animal Health Laboratory, South Dakota Agricultural College, has reported an outbreak of rabies among skunks, dogs, cattle, and civet cats in the eastern part of the State. It is also reported that an epizootic of rabies in wild animals of Iowa and Minnesota is moving west and northward. In Day County, S. Dak., an organized program is being inaugurated to reduce the wild animal population.

The Washington State Health Department reports rabies among dogs in Spokane. Control measures have been instituted by health and agricultural authorities.

### *Infectious Hepatitis*

Dr. R. M. Albrecht, New York State Department of Health, has reported three cases of infectious hepatitis in a general hospital in

the eastern part of the State. Two were student nurses and one was an employee. Dates of onset were December 20, January 1, and January 14. All the cases had been in contact with each other. No common source of infection is suspected.

*Anthrax*

Dr. W. A. Longshore, California Department of Public Health, reports that two cases of anthrax occurred in the State during February. A 4-year-old boy developed a malignant pustule on the leg. A lamb which had been brought into the home for bottle feeding was given as the source. A sheepherder was reported to have anthrax, and sick sheep were found in his herd.

*Diphtheria*

Dr. W. A. Longshore, in a supplementary report, states that 10 cases with 2 deaths from diphtheria occurred in Humboldt County (previously reported in the Communicable Disease Summary for the week ended January 27). The fatal cases were a 7-year-old boy and his 45-year-old father. This report comments that the outbreak is an example of the changing pattern which diphtheria is showing in California. Cases are occurring in adults chiefly in the low socioeconomic groups and occasionally in children who have not had adequate protection.

*Comparative Data for Cases of Specified Reportable Diseases: United States*

[Numbers after diseases are International List numbers, 1948 revision]

| Disease | Total for week ended— Mar. 24, 1951 | Mar. 25, 1950 | 5-year median 1946–50 | Seasonal low week | Cumulative total since seasonal low week 1950–51 | 1949–50 | 5-year median 1945–46 through 1949–50 | Cumulative total for calendar year— 1951 | 1950 | 5-year median 1946–50 |
|---|---|---|---|---|---|---|---|---|---|---|
| Anthrax (062) | 1 | | | (1) | (1) | (1) | (1) | 17 | 5 | 11 |
| Diphtheria (055) | 90 | 114 | 160 | 27th | 4,005 | 6,171 | 8,904 | 1,098 | 1,900 | 2,546 |
| Encephalitis, acute infectious (082) | 22 | 17 | 7 | (1) | (1) | (1) | (1) | 171 | 154 | 97 |
| Influenza (480–483) | 12,699 | 17,954 | 2,578 | 30th | [2]95,758 | 103,099 | 103,099 | [2]81,216 | 92,515 | 58,166 |
| Measles (085) | 17,575 | 11,940 | 21,613 | 35th | 185,646 | 105,271 | 210,368 | 156,945 | 86,141 | 175,422 |
| Meningitis, meningococcal (057.0) | 100 | 116 | 106 | 37th | 2,267 | 2,026 | 2,011 | 1,306 | 1,112 | 1,040 |
| Pneumonia (490–493) | 2,091 | 3,147 | (3) | (1) | (1) | (1) | (1) | 24,154 | 30,709 | (3) |
| Poliomyelitis, acute (080) | 41 | 62 | 33 | 11th | 41 | 62 | 33 | 1,253 | 1,193 | 643 |
| Rocky Mountain spotted fever (104) | 1 | | | (1) | (1) | (1) | (1) | 4 | 11 | 11 |
| Scarlet fever (050)[4] | 2,206 | 1,993 | 2,933 | 32d | [5]43,294 | 38,012 | 56,733 | [5]27,603 | 21,573 | 32,977 |
| Smallpox (084) | | 1 | 3 | 35th | 14 | 34 | 54 | 6 | 13 | 33 |
| Tularemia (059) | 17 | 19 | 20 | (1) | (1) | (1) | (1) | 165 | 273 | 273 |
| Typhoid and paratyphoid fever (040, 041)[6] | 30 | 48 | 45 | 11th | 30 | 48 | 45 | 465 | 558 | 522 |
| Whooping cough (056) | 1,292 | 2,901 | 2,198 | 39th | 40,759 | 52,571 | 52,571 | 19,157 | 31,035 | 26,557 |

[1] Not computed.
[2] Delayed report: Maine, week ended Mar. 17, 1,323 cases.
[3] Data not available.
[4] Including cases reported as streptococcal sore throat.
[5] Deduction: Arkansas, week ended Mar. 17, 2 cases.
[6] Including cases reported as salmonellosis.

## Reported Cases of Selected Communicable Diseases: United States, Week Ended Mar. 24, 1951

[Numbers under diseases are International List numbers, 1948 revision]

| Area | Diphtheria (055) | Encephalitis, infectious (082) | Influenza (480–483) | Measles (085) | Meningitis, meningococcal (057.0) | Pneumonia (490–493) | Poliomyelitis (080) |
|---|---|---|---|---|---|---|---|
| **United States** | **90** | **22** | **12,699** | **17,575** | **100** | **2,091** | **41** |
| **New England** | **5** | - | **2,431** | **647** | **2** | **180** | - |
| Maine | 1 | - | 1,563 | 3 | - | 56 | - |
| New Hampshire | - | - | 191 | 15 | - | 11 | - |
| Vermont | - | - | 41 | 94 | - | - | - |
| Massachusetts | 4 | - | - | 452 | 2 | - | - |
| Rhode Island | - | - | 6 | 5 | - | - | - |
| Connecticut | - | - | 630 | 48 | - | 113 | - |
| **Middle Atlantic** | **19** | **9** | **290** | **1,913** | **14** | **366** | **4** |
| New York | 3 | 8 | [1] 222 | 643 | 8 | 118 | 4 |
| New Jersey | 3 | 1 | 68 | 335 | - | 138 | - |
| Pennsylvania | 13 | - | - | 935 | 6 | 110 | - |
| **East North Central** | **2** | **5** | **76** | **2,645** | **22** | **165** | **2** |
| Ohio | - | - | - | 569 | 9 | - | 1 |
| Indiana | 2 | 2 | 39 | 228 | 2 | 15 | - |
| Illinois | - | 2 | 7 | 330 | 4 | 55 | - |
| Michigan | - | 1 | 30 | 552 | 3 | 95 | - |
| Wisconsin | - | - | - | 966 | 4 | - | 1 |
| **West North Central** | **5** | **1** | **21** | **1,090** | **1** | **19** | **6** |
| Minnesota | - | - | 2 | 64 | 1 | 5 | 1 |
| Iowa | 2 | - | - | 84 | - | - | 1 |
| Missouri | - | - | 1 | 340 | - | - | 1 |
| North Dakota | 1 | - | 11 | 40 | - | 7 | - |
| South Dakota | 2 | 1 | - | 19 | - | - | 1 |
| Nebraska | - | - | - | 14 | - | - | - |
| Kansas | - | - | 7 | 529 | - | 7 | 2 |
| **South Atlantic** | **15** | **1** | **2,500** | **1,676** | **19** | **225** | **3** |
| Delaware | - | - | 46 | 10 | - | - | - |
| Maryland | 5 | - | 13 | 109 | 2 | 45 | - |
| District of Columbia | - | - | - | 31 | - | 12 | - |
| Virginia | - | - | 804 | 599 | 3 | 86 | - |
| West Virginia | 1 | - | 734 | 147 | 2 | 30 | 1 |
| North Carolina | 6 | - | - | 84 | 4 | - | - |
| South Carolina | 2 | - | 427 | 28 | 4 | 20 | - |
| Georgia | 1 | - | 476 | 641 | 2 | 32 | - |
| Florida | - | 1 | - | 27 | 2 | - | 2 |
| **East South Central** | **11** | **2** | **220** | **464** | **6** | **83** | **2** |
| Kentucky | - | - | 90 | 231 | - | 5 | - |
| Tennessee | 3 | 1 | 101 | 79 | 3 | - | - |
| Alabama | 5 | 1 | - | 30 | 3 | 44 | 1 |
| Mississippi | 3 | - | 29 | 124 | - | 34 | 1 |
| **West South Central** | **22** | **1** | **933** | **4,490** | **19** | **708** | **5** |
| Arkansas | 2 | - | 821 | 593 | 2 | 140 | - |
| Louisiana | 1 | - | 19 | 89 | 1 | 49 | 2 |
| Oklahoma | 2 | - | 93 | 258 | - | 46 | - |
| Texas | 17 | 1 | - | 3,550 | 16 | 473 | 3 |
| **Mountain** | **7** | **1** | **2,217** | **1,849** | **3** | **174** | **7** |
| Montana | 1 | - | 50 | 301 | - | 2 | - |
| Idaho | 1 | - | - | 29 | - | - | 2 |
| Wyoming | - | - | - | 81 | - | 2 | - |
| Colorado | 1 | 1 | 22 | 674 | 2 | 14 | 3 |
| New Mexico | - | - | 13 | 60 | - | 65 | - |
| Arizona | 4 | - | 2,132 | 614 | 1 | 91 | 2 |
| Utah | - | - | - | 45 | - | - | - |
| Nevada | - | - | - | 45 | - | - | - |
| **Pacific** | **4** | **2** | **4,011** | **2,801** | **14** | **171** | **12** |
| Washington | 2 | - | 1,204 | 570 | 3 | 36 | 2 |
| Oregon | 1 | - | 1,965 | 109 | 2 | 55 | 3 |
| California | 1 | 2 | 842 | 2,122 | 9 | 80 | 7 |
| Alaska | - | - | 45 | - | - | - | - |
| Hawaii | - | - | - | 3 | - | - | - |

[1] New York City only. *Anthrax:* Pennsylvania, 1 case.

## Reported Cases of Selected Communicable Diseases: United States, Week Ended Mar. 24, 1951—Continued

[Numbers under diseases are International List numbers, 1948 revision]

| Area | Rocky Mountain spotted fever (104) | Scarlet fever (050) | Smallpox (084) | Tularemia (059) | Typhoid and paratyphoid fever[1] (040, 041) | Whooping cough (056) | Rabies in animals |
|---|---|---|---|---|---|---|---|
| **United States** | 1 | 2,206 | | 17 | 30 | 1,292 | 137 |
| **New England** | | 211 | | | 2 | 96 | |
| Maine | | 17 | | | | 20 | |
| New Hampshire | | [2] 21 | | | | 2 | |
| Vermont | | 8 | | | | 10 | |
| Massachusetts | | 142 | | | 2 | 46 | |
| Rhode Island | | 5 | | | | 15 | |
| Connecticut | | 18 | | | | 3 | |
| **Middle Atlantic** | | 342 | | | 1 | 199 | 10 |
| New York | | [2] 175 | | | | 84 | 10 |
| New Jersey | | 58 | | | | 56 | |
| Pennsylvania | | 109 | | | 1 | 59 | |
| **East North Central** | | 701 | | 5 | 1 | 122 | 11 |
| Ohio | | 166 | | | | 22 | 3 |
| Indiana | | 62 | | | 1 | 10 | 5 |
| Illinois | | 83 | | 4 | | 13 | 1 |
| Michigan | | 318 | | 1 | | 49 | 1 |
| Wisconsin | | 72 | | | | 28 | 1 |
| **West North Central** | | 117 | | 3 | 1 | 61 | 10 |
| Minnesota | | 26 | | | | 3 | |
| Iowa | | 10 | | | | 9 | 10 |
| Missouri | | 36 | | 3 | 1 | 7 | |
| North Dakota | | 1 | | | | 2 | |
| South Dakota | | 1 | | | | 5 | |
| Nebraska | | 8 | | | | 7 | |
| Kansas | | 35 | | | | 28 | |
| **South Atlantic** | | 203 | | 2 | 8 | 196 | 28 |
| Delaware | | 2 | | | | 1 | |
| Maryland | | 27 | | | 1 | 9 | |
| District of Columbia | | 10 | | | 1 | 1 | |
| Virginia | | 44 | | 1 | | 103 | 8 |
| West Virginia | | 17 | | | | 13 | 2 |
| North Carolina | | 59 | | | | 24 | |
| South Carolina | | 4 | | | 1 | 20 | 12 |
| Georgia | | 24 | | 1 | 5 | 24 | 6 |
| Florida | | [2] 16 | | | | 1 | |
| **East South Central** | 1 | 64 | | 1 | 7 | 44 | 29 |
| Kentucky | | 7 | | | | 7 | 9 |
| Tennessee | 1 | 41 | | | 5 | 11 | 4 |
| Alabama | | 12 | | 1 | | 22 | 10 |
| Mississippi | | 4 | | | 2 | 4 | 6 |
| **West South Central** | | 98 | | 5 | 6 | 344 | 41 |
| Arkansas | | | | 5 | | 42 | 11 |
| Louisiana | | 16 | | | 2 | 4 | |
| Oklahoma | | 30 | | | 1 | 13 | 2 |
| Texas | | 52 | | | 3 | 285 | 28 |
| **Mountain** | | 156 | | 1 | 1 | 181 | 1 |
| Montana | | 5 | | | | 2 | |
| Idaho | | 36 | | | | 7 | |
| Wyoming | | 1 | | 1 | | 5 | |
| Colorado | | 11 | | | 1 | 12 | |
| New Mexico | | 4 | | | | 10 | |
| Arizona | | 3 | | | | 139 | 1 |
| Utah | | [2] 96 | | | | 6 | |
| Nevada | | | | | | | |
| **Pacific** | | 314 | | | 3 | 49 | 7 |
| Washington | | 112 | | | | 13 | 4 |
| Oregon | | 37 | | | 1 | 8 | |
| California | | [2] 165 | | | 2 | 28 | 3 |
| Alaska | | 3 | | | | 1 | |
| Hawaii | | 1 | | | | | |

[1] Including cases reported as salmonellosis.    [2] Including cases reported as streptococcal sore throat.

# FOREIGN REPORTS

## CANADA

*Reported Cases of Certain Diseases—Week Ended Mar. 10, 1951*

| Disease | Total | New-foundland | Prince Edward Island | Nova Scotia | New Brunswick | Quebec | Ontario | Manitoba | Saskatchewan | Alberta | British Columbia |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Brucellosis | 3 | | | | | 1 | | | | 2 | |
| Chickenpox | 946 | 1 | | 19 | | 230 | 467 | 34 | 20 | 55 | 120 |
| Diphtheria | 5 | | | | | | 1 | 1 | 3 | | |
| Dysentery, bacillary | 4 | | | | | 4 | | | | | |
| German measles | 364 | | | 67 | | 29 | 175 | 1 | 10 | 41 | 41 |
| Influenza | 4,770 | 219 | | 2,407 | 26 | | 530 | 98 | 337 | | 1,153 |
| Measles | 1,673 | 4 | | 84 | 2 | 279 | 1,165 | 58 | 21 | 28 | 32 |
| Meningitis, meningococcal | 12 | | | | 4 | 1 | 7 | | | | |
| Mumps | 1,041 | 3 | | 12 | 3 | 216 | 381 | 50 | 87 | 114 | 175 |
| Poliomyelitis | 1 | | | | 1 | | | | | | |
| Scarlet fever | 269 | | | 3 | | 67 | 53 | 29 | 19 | 36 | 62 |
| Tuberculosis (all forms) | 208 | 4 | | 3 | 6 | 75 | 37 | 24 | 12 | 3 | 44 |
| Typhoid and paratyphoid fever | 7 | | | | | 2 | | | | 1 | 4 |
| Venereal diseases: | | | | | | | | | | | |
| Gonorrhea | 284 | 8 | | 9 | 3 | 106 | 35 | 23 | 13 | 30 | 57 |
| Syphilis | 124 | 7 | | 7 | 1 | 61 | 18 | 4 | 12 | 6 | 8 |
| Primary | 8 | | | 1 | | 4 | 1 | | | 2 | |
| Secondary | 6 | | | | | 4 | 2 | | | | |
| Other | 110 | 7 | | 6 | 1 | 53 | 15 | 4 | 12 | 4 | 8 |
| Whooping cough | 126 | 1 | | 1 | 1 | 38 | 57 | 10 | 3 | 1 | 14 |

## REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

**The following reports include only items of unusual incidence or special interest and the occurrence of these diseases, except yellow fever, in localities which had not recently reported cases. All reports of yellow fever are published currently. A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.**

### Cholera

*Burma.* During the week ended March 17, 1951, 24 cases of cholera were reported in Moulmein as compared with 6 for the previous week.

### Plague

*India.* For the week ended March 17, 1951, two imported cases of plague were reported in Allahabad and one in Bombay. During the week ended March 10, 1951, three and seven cases were reported in Lucknow and Nagpur, respectively.

### Smallpox

*Belgian Congo.* During the week ended March 3, 1951, 39 cases of smallpox were reported in Belgian Congo.

*Dahomey.* During the period March 1–10, 1951, 35 cases of smallpox were reported in Dahomey.

*India.* The smallpox epidemic continues to increase in Bombay where 115 cases were reported for the week ended March 17, 1951, compared with 103 cases for the previous week. Other ports of India reporting large numbers of smallpox cases for the week ended March 17, 1951, were as follows: Calcutta 571, Cocanada 21, Masulipatnam 12, Allahabad 11, and Visakhapatnam 10.

*India (French).* For the week ended March 10, 1951, 219 cases of smallpox were reported in Pondicherry as compared with 149 for the previous week. There were 215 cases reported in the city for the week ended February 24.

### Yellow Fever

*Brazil.* During the recent outbreak of jungle yellow fever in Brazil deaths have been confirmed in counties of Goiaz State as follows: Jaragua, December 22, 1950, one; Goiaz, January 13–February 9, 1951, three; Niquelandia, January 14–16, 1951, three; Uruacu, January 13–14, two; Porangatu, January 17, one; and Goiania, February 9, one. In Mato Grosso State, Guiratinga County, two confirmed deaths were reported for the period January 23–29, 1951.

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The PUBLIC HEALTH REPORTS, first published in 1878 under authority of an act of Congress of April 29 of that year, is issued weekly by the Public Health Service through the Division of Public Health Methods, pursuant to the following authority of law: United States Code, title 42, sections 241, 245, 247; title 44, section 220.

It contains (1) current information regarding the incidence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

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# Public Health Reports

VOLUME 66 APRIL 20, 1951 NUMBER 16

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FEDERAL SECURITY AGENCY

PUBLIC HEALTH SERVICE

FEDERAL SECURITY AGENCY
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PUBLIC HEALTH SERVICE
*Leonard A. Scheele, Surgeon General*

Division of Public Health Methods
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# Public Health Reports

*Vol. 66* • APRIL 20, 1951 • *No. 16*

## Use of State Advisory Councils in the Hospital Survey and Construction Program

By Louis S. Reed, Ph.D.*

The purpose of this article is to describe the composition of the advisory councils established by the States under the hospital survey and construction program and to describe and appraise the role the councils play in carrying out the State programs.

Its conclusions may go beyond the confines of the hospital survey and construction program since advisory councils might conceivably be useful and their establishment might be called for in other existing or potential health programs.

This study of the composition and role of the State advisory councils under the hospital survey and construction program was initiated on request of the Federal Hospital Council. The Council was interested in the composition of the various State councils as to adequate representation of the general public, the role councils were playing in the program, and what their role should be.

### Federal Requirements and Suggestions Relative to Councils

The Hospital Survey and Construction Act requires States participating in either the survey or construction phase of the program to designate, for each phase, a State advisory council to consult with the State agency in carrying out the program. This council, the act specifies, "shall include representatives of non-Government organizations or groups, and of State agencies, concerned with the operation, construction, or utilization of hospitals, including representatives of the consumers of hospital services selected from among persons familiar with the need for such services in urban or rural areas . . ."

The Grants-in-Aid Manual, developed by the Public Health Service to guide the States in drawing up and carrying out a State plan, provides a number of instructions or suggestions regarding the advisory councils. Thus, the manual states that the State advisory council

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appointed to serve the State agency during the survey and planning period of the program may continue to serve the agency responsible for the construction phase if that agency so chooses. Other instructions or suggestions are:

"The number of members appointed to the council is discretionary with the State agency provided that at least one member of each of the required groups is appointed. It is believed that a small representative council would be more helpful to the State agency than a council which has a large membership. A balance between consumer and professional representation is desirable.

"If a large State advisory council is appointed and a working subcommittee is chosen from the advisory council, the working subcommittee should include members representing the groups, interests and professions required by the act . . .

"The State advisory council shall be limited solely to advisory functions in order that the State plan may conform with the requirements of the act that there be designated a *single agency* as the *sole agency* for the administration of the State plan." [1]

## Composition of the Councils [2]

*Size of Councils*

A study of the composition of the advisory councils as of February 1, 1949, showed that the 50 States and Territories, for which information was then available, had a total of 737 persons on their councils, an average of slightly more than 14 persons per council. The smallest council had 5 members, the largest 42. The distribution of States according to size of advisory council follows:

| *Size of council (Number of members)* | *Number of States* |
|---|---|
| 5 | 1 |
| 6–10 | 18 |
| 11–15 | 13 |
| 16–20 | 6 |
| 21–25 | 6 |
| 26–30 | 3 |
| 31–42 | 3 |
| Total | 50 |

*Interests or Groups Represented*

An examination of the affiliation of members showed (table 1) that of the grand total (737) of all the council members, 311, or 42 percent,

[1] Public Health Service, Grants-in-Aid Manual, 23–2, Section 5.

[2] This report deals solely with the permanent councils now advising the States on the continuing survey and construction programs. A few of the States appointed temporary councils to serve in the survey and planning phase of the program, but these have now been superseded by the permanent councils advising on the continuing program.

consisted of persons directly or indirectly engaged in the provision of health services, that is, physicians, dentists, nurses, hospital administrators, druggists, officials of associations of these professions, and persons connected with medical schools. Hospital trustees were also included in this group on the ground that as trustees they are directly concerned with the provision of health services, even though as lay persons they have interests which ally them with the consumers of health services. Of these 311 persons who might be said by affiliation or interest to represent the "providers of health services," the largest group (120) consisted of physicians. The vast majority of these were in private practice; a few were the paid secretaries of medical societies. The next largest group (119) consisted of hospital administrators or officials of hospital associations.

**Table 1.** *Affiliations of members of State Advisory councils of 50 States and Territories*

[As reported in State plans as of Feb. 1, 1949]

| Affiliations | Council members | | Number of States having one or more persons of specified affiliations |
|---|---|---|---|
| | Number | Percent | |
| Total | 737 | 100 | 50 |
| Persons concerned with the provision of health services | 311 | 42 | 50 |
| Physicians in private practice and officials of medical societies | 120 | 16 | 49 |
| Presidents, deans, or faculty members of medical schools | 12 | 2 | 9 |
| Hospital administrators and officials of hospital associations | 119 | 16 | 46 |
| Hospital trustees | 9 | 1 | 7 |
| Druggists and officials of pharmaceutical associations | 8 | 1 | 7 |
| Dentists and officials of dental associations | 13 | 2 | 12 |
| Nurses and officials of nursing associations | 30 | 4 | 25 |
| Persons connected with consumer groups | 277 | 38 | 49 |
| Business men, and professional persons (other than members of the health profession) and officials of business and professional associations | 95 | 13 | 36 |
| Officials of Blue Cross plans | 9 | 1 | 7 |
| Officials of labor organizations | 33 | 5 | 24 |
| Farmers and officials of agricultural organizations | 33 | 5 | 26 |
| Church groups | 23 | 3 | 19 |
| Voluntary health organizations | 16 | 2 | 12 |
| Other civic organizations and consumer interests | 52 | 7 | 25 |
| Educational organizations other than medical schools | 16 | 2 | 12 |
| Persons connected with governmental agencies | 125 | 17 | 46 |
| Architects | 24 | 3 | 24 |

Of the 737 council members, 277, or 38 percent, were lay persons, not connected with any governmental agency, who could be classed as "consumers of health services." The largest group of these persons (95) consisted of business and professional men and women. The next largest group (52) contained officials of, or representatives of, various civic groups or organizations. The next largest groups, each numbering 33, consisted of officials of labor organizations, and of farmers or officials of agricultural organizations, such as the Farm Bureau, Grange, and Farmers Union. Most of the remaining consumer representatives were officials of, or directly connected with,

church groups, voluntary health organizations, and schools or universities. A few States had invited the executive directors of Blue Cross Plans to serve on their councils. These persons were classified as representatives of the consumers of health services because in the purchase of hospital care on a wholesale basis from hospitals their interests would appear to be aligned with those of the consumers of hospital service. However, in some respects these individuals might well be classified among those concerned with the provision of health services.

Of the 737 council members, 125 were connected with governmental agencies. These included State or local public health officers, officials of educational and welfare agencies, heads of State mental institutions or departments of mental hygiene. It was hard to say whether some of these individuals should be classified as representatives of the providers or consumers of health services, and so they were placed in a separate classification.

Also placed in a separate classification were 24 persons who were architects and thus might be said to represent a special interest.

Almost all of the State councils, as shown in table 1, include one or more representatives of the medical profession; almost all include one or more hospital administrators or officials of hospital associations; 25 of the States have a nurse, or an official of a nursing association, as a member of their councils; 9 have a president, dean, or faculty member of a medical school as a member; and 12 have one or more dentists or an official of a dental association.

Turning now to representatives of the consumers, we find that 36 of the State councils had one or more business or professional members (other than members of the health professions); 24 had officials of labor organizations; 26 had one or more farmers or officials of agricultural associations; 19 had representatives of church groups; 12 had persons who were connected with education, or educational organizations other than medical schools, and 25 States had other persons who, in their own right or as an official of some civic organization, could be classified as representing the general public.

Most of the States had councils fairly well balanced among representatives of the professions and agencies providing care, the general public, that is, the consumers of hospital services, and governmental agencies. A few States, however, appeared to have top-heavy representation of one or the other of these groups. Thus, in 13 States more than half of the council members were physicians, hospital administrators or trustees, or officials of medical and hospital associations. In a few of these States the consumer representation was very low; one State had no representatives of the general public other than hospital trustees.

A few States probably had too little representation of the medical

and hospital professions. In six States or Territories less than 20 percent of the council members could be said to represent the medical profession or hospital interests. In one State more than one-half of the members of the council were persons connected with public agencies.

## Role of the Councils

To obtain information on how the States were using their councils and the role played by the councils, a questionnaire was sent out to the States through the Regional Offices of the Federal Security Agency in January 1950. Returns to this questionnaire were received from 50 of the 53 State and Territorial agencies.

### *Number of Meetings*

1. "How many meetings of the council were held in the calendar years 1948 and 1949?"

The replies of the States to this question are summarized in table 2. The average number of meetings per council was 3.4 in 1948 and 3.0 in 1949. The average was raised for 1948 by one State which had 19 meetings of its council. If this State were excluded, the average number of meetings was about the same in both years. Five States had no meeting of their councils in 1948 and 4 States had none in 1949; an additional 11 States in 1948 and 9 States in 1949 had only one meeting in the year. Well over half of the States in 1949 had two, three, or four meetings.

### *Items Discussed at Meetings*

2. "What were the items discussed at the last two meetings of the council?"

The items listed covered the entire gamut of all matters relating to the program. Most often listed were: the consideration of revisions or amendments of the State plan; determination of State policy with respect to the percentage of the cost of projects which should be borne from Federal funds (the amendments to the Federal act passed in October 1949 gave considerable discretion to the States in determining the Federal share of construction costs); review of the program; consideration of Federal legislation affecting the program; matters concerned with licensure of hospitals (many of the State agencies are also responsible for licensing hospitals and the advisory council advises on this program as well); allocation of Federal funds among the various categories of facilities, that is, general hospitals, mental hospitals, health centers, etc. Among other subjects discussed were such matters as chronic disease hospitals, coordination of hospital facilities, hospital finances, hospital construction costs, the need of the State agencies for additional personnel or administra-

Table 2. *Number of meetings of council*

| Number of meetings | Number of States having specified number of meetings | |
|---|---|---|
| | 1948 | 1949 |
| 0 | 5 | 4 |
| 1 | 11 | 9 |
| 2 | 4 | 11 |
| 3 | 8 | 7 |
| 4 | 10 | 14 |
| 5 | 2 | 2 |
| 6 | 6 | 2 |
| 7 | 1 | 1 |
| 8 | 2 | ------ |
| 19 | 1 | ------ |
| Total | 50 | 50 |

tive funds, community clinics, and the desirability or use of State grant-in-aid funds.

*Matters and Problems on Which Advisory Council Is Consulted*

3. "Does the State agency ask the advice of the council on all major policy matters?"

To this question 43 of the States replied "yes," 6 replied "no," and 1 State said that it asked the advice of the council on most policy matters.

4. "What kind of problems does the State agency present to the council for advice?"

Most of the States indicated that they consulted the council on all, or on all major, matters of policy. In general, the lists of specific problems or subjects were similar to the items discussed at the preceding meetings of the council, namely, revision or amendment of the State plan, priorities, approval of applications, allocation of funds among categories of facilities, licensure, etc. One State replied that it had presented only the more serious problems to its council for consideration, and two States indicated that they had not yet presented any problems to the council.

5. "Did the council consider the last revision of the State plan prior to its adoption by the State agency?"

To this question 43 States replied "yes," 6 States "no," and 1 State said that as yet it had made no revision of its State plan.

6. "Does the council consider all amendments to the State plan before they are adopted?"

Of the 50 States, 36 replied in the affirmative and 10 in the negative;

3 States said that the council considered only major amendments, and 1 State said that as yet it had not amended its plan.

*Educational Role of the Council*

7. "Has the council been useful in educating, as regards the program, the public and professional groups which the members represent?"

The great majority, 36, of the States indicated that the council had been useful in this regard and only 6 States replied that the council had not been useful in this respect. The remaining States gave a qualified answer. Four indicated that the council had been useful to "some extent"; two stated that the matter was questionable; one replied that as yet there was insufficient evidence to indicate one way or another that the council had been useful in this regard; and one State did not reply.

*Advisory Character of the Council*

8. "Is the council purely advisory in character, or does it, in effect, to a large degree participate with the State agency in the formulation of policy?"

The majority of the States, 27 out of 50, indicated that the council participated in policy formulation. Fifteen States replied that the council was purely, or almost purely, advisory. Another five States stated, in effect, that the council was advisory, but its recommendations are almost always, or usually, accepted by the State agency. Another two States indicated that the council was chiefly or mainly advisory, and the remaining States said that the question was difficult to answer—the council was purely advisory but did participate in the formulation of policy.

Quotation of representative replies will serve to make the situation meaningful:

"The council makes recommendations to the department—administrative responsibility rests with the department to accept or reject such recommendations."

"Yes—purely advisory."

"Mostly advisory, but may participate in formulating policy."

"Assists State agency in the formation of major policies."

"To large degree participates in policy making and decisions concerning administration of hospital construction program."

"The council is advisory on hospital construction but does participate or make recommendations in the formulation of policies. The council is the authority on hospital licensure."

"To quite an extent the council does participate with the State agency in the formulation of policy."

"Relations between council and director are mutually agreeable. Question difficult to answer. However, council scrupulously considers its character as purely advisory."

"It is advisory and to date its recommendations have been accepted in toto by the public health council."


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"Council recommends and approves major policies."

"Acts only in the advisory capacity but council's recommendations are usually adopted."

"While the council's function is 'advisory' in effect, it serves as a clearing house for practically all problems involved in the development and enforcement of the State plan. Differences of opinion have been encountered and satisfactory compromises reached in all instances. The council does participate in the formulation of policy."

"Participates with State agency in formulation of policy."

"Establishes policy."

"Participates in policy determination. Follows staff recommendations closely—then recommends to director of public health."

"Legal status of council is advisory, however, it does participate in formulating policies for conduct of hospital program in State."

The opinion of a State as to whether its council is purely advisory or participates in formulation of policy appears to be correlated highly with the extent to which the State uses its council. Thus, the States indicating that their councils participate in policy formulation have also tended to make the greatest use of their councils. They have had a fair number of council meetings, have consulted the council on all policy matters, and asked the council to consider all revisions and amendments of the State plan. Contrariwise, among the States indicating that their councils are purely advisory are found all of the States which have made little or no use of their advisory councils. These States include all of those which had no meetings of their councils either in 1948 or 1949. Among these States are also the few which indicated that they did not ask the advice of the council on all policy matters, and that the council did not consider the last revision of their State plan. The States which indicated that their councils are purely advisory also include most of the States which report that their council has been of little or no value in educating, with regard to the program, the public and professional groups the members represent.

*Value of the Council*

9. "Has the council been of material value in carrying out the program? If so, in what respects?"

The vast majority, 41, of the States answered "yes" to this question; 7 said "no," and 2 gave qualified answers, namely, "to some extent" and "on two or three occasions." It is significant that the seven States which stated that the council had been of no material value included four States which had no meeting of their council in 1949 and two other States which had no meeting of their council in 1948. Five of the seven States were also among the six States which indicated that they did not ask the advice of the council on all policy matters. The State which indicated that its council had been of value only on "two or three occasions" was the remaining one of the six States which did not ask the advice of their council on all policy matters.

In short, if States make use of their councils, they find the council of value; if they do not make use of the council, they find it of no value. Among the respects in which the States have found their councils of value, five or six are mentioned repeatedly. The council, when composed of capable individuals, promotes discussion of problems by a group composed of individuals of different experiences and background, and the decisions arrived at through this group's thinking are frequently better than might have been arrived at by a single individual. Being composed of representatives of various groups concerned with the program—the medical profession, hospitals, the general public—the council members can interpret to the State agency the needs, desires, and attitudes of these groups. In turn the same individuals can interpret to the group which they represent the agency's program and its decisions on various points. Thus, the council can act as a two-way liaison between the State agency and the various groups concerned with the program. The council, too, can act as a "buffer" between the State agency and the various groups concerned with the program. A decision which is unpalatable to a particular community or group is frequently better received when it can be said that the decision was made by the council than when the decision is announced as made by a single individual. The council, if composed of individuals of high caliber who are widely representative, lends prestige and support to the program. Finally, the council can make recommendations, and its individual members can take action with respect to State legislation (for example, the need for additional administrative funds for the State agency) which the director of the State agency might not be able to do as well.

Direct quotations of some of the replies to the question of whether the council has been valuable, and in what respects, follow:

"Yes—has brought us mature and diverse viewpoints from various areas; helped keep public informed locally; assisted with necessary legislation."

"Yes—(1) it focuses attention to possible means of improving the program; (2) it gives opportunity for the expression of representative opinions and ideas."

"Yes—brought representative but varied viewpoints into discussions and decisions."

"Yes—the composition of the advisory council is such that any matter or problem brought before it usually results in an intelligent discussion and recommendation on same."

"Yes—the various interests of the State are represented; therefore, policies of the hospital construction program reflect the studies, recommendations, and thinking of the various groups interested in the program."

"Yes—it gave broad State-wide participation in program planning."

"Yes—aids the State director of health in making decisions. A help in securing cooperation of groups represented. A group on whom to place responsibility for decisions."

"Yes—better cooperation from certain groups—and a buffer."

"Yes—assists in a better community understanding of the program. Encourages

public acceptance; increases the cooperation of professional groups and associations; makes pertinent recommendations on policy matters."

"No—the council has been helpful in giving advice, but the program is so small that we hesitate to call the council together except on those infrequent occasions when matters of considerable importance arise."

"Yes—has been the liaison between State agency and the general public. Has conducted the public hearings regarding State plan and revision, has contacted legislators regarding appropriations."

### *Views of States on Proper Role of an Advisory Council*

10. "Please state briefly your views as to what role the advisory councils should play in the program."

Perhaps it is best here to let the States speak for themselves. First are quoted the statements of States which reported their councils to be useful:

"An active advisory council with broad viewpoint and willingness to plan a long-range program is a necessity. If the law did not provide for such an advisory council we would develop one to assist in furthering the needs of rural health for our State."

"As a liaison group between all. To conduct any hearings regarding projects if needed; to review State plans as to fairness and adequacy in meeting needs of States. Advise in any and all matters regarding administration of State plan; to advise in special problems that may arise; support legislation pertaining to hospitals and health centers at least informally."

"(A) Reflect attitudes of local and professional groups; (B) recommend and advise on major policy matters; (C) support the department in carrying out major policy and in its administration of the program."

"Educational, promotional, interpretive, advisory. An advisory council brings additional breadth of view to program planning. Brings knowledge of needs of areas or groups, and can interpret desires of groups represented. Can give real guidance, some specialized skills, and valuable advice. Our working relationship is excellent and helpful to State agency."

"To assist in formulating program policy through discussion of major matters with the commission. Disseminating information about the purpose of the program with a view to making the public more hospital-minded. Use should be made of specialized knowledge and position of members to further purpose of program.

"Suggest more frequent meetings of the council to promote thorough familiarity with program and policies, thus making the members better qualified to influence public opinion, particularly in areas where the campaign to instill community interest in the hospital program lacks impetus.

"Careful selection of members of advisory council with a view to appointing those particularly well qualified as to experience in the hospital field, prestige, and enthusiasm for furthering improvements in health services."

"Council helps in policy making. Is of considerable value when controversial issues arise."

"Assist in sponsoring legislation, publicizing the program, formulate major policies, develop research projects relative to the hospital program; act as a representative for the various organizations and interest groups of the State. Act as a buffer for the State Agency."

"Advisory councils should continue to be the clearing houses for the discussion of the general philosophy of the Federal-State program, and State agencies should benefit greatly from the advice and counsel to be gained from the varied interests represented on the councils, interests which represent the public as contrasted with the governmental aspect which is gained by those of us working closely with the program.

"The use of advisory hospital councils can be expanded when the construction program reaches a peak in activities and when further advice and assistance will be needed in consolidating gains made under the program and further guidance required in creating a proper balance among the five categories of facilities eligible under the act. Support of the councils may be solicited in the growing need for the provision of facilities for the long-term patient, i. e., chronically ill, chronic insane, tubercular, etc. The promotion and creation of public health centers is a field in which the council can be of further assistance. I believe that individuals in the hospital and related field, as well as the public, have greater confidence in a program which is reviewed and passed upon by a group other than the governmental bureau or agency working directly with the program."

"Council can be of considerable assistance to the State agency by expressing the views of the different groups represented. Many of the views expressed by council members have been extremely valuable in the development of the plan. In addition, the members can help disseminate information relative to the plan to the people of the State."

"We believe that our advisory council is composed of seven of the most competent and well-qualified men in the State. The commission, consisting of the governor, chairman of the State road department, and three appointed officials, has never failed in a single instance to approve the recommendations of our State advisory council. The value of an advisory council depends almost entirely on the caliber of men serving on the council. Our State has been most fortunate in securing the services of competent men."

"Should advise the State health department on major policy matters of a nontechnical nature in the administration of the program. They should serve as the liaison between the health department and the public which they represent, explaining to their constituents the need for, value, and opportunities under the program.

"Discussion of excessive technical details by untrained persons can result in loss of time of technical personnel and has little other than individual educational value."

"An advisory council serves to bring in the knowledge and experience of many individuals who have real contributions to make in advising on this program. The board of health, which has legal administrative responsibility, still retains final decision in establishing policies after having had the opportunity of considering advice of the council."

"There are no politics in the State's program. This is because of governor's and department's policy—such policy is implemented by support of council members of ability and integrity. The council members are known and respected throughout the State. They lend prestige to the program and have contributed materially to its acceptance by the public as a rational activity of government."

"Advisory council should take a more active part in the program especially in public relations. In this way education, as regards the program, would come from a source other than the State agency, and possibly overcome certain prejudices that may exist toward State and governmental bureaus or agencies."

"Believe the position of the council might be strengthened to make its approval of policies mandatory."

The comments from some of the States which found their councils to be of little or no value are just as revealing:

"Advisory and possibly unnecessary as a State agency."

"From our experience with the advisory council we have found it of little value. If our budget were large enough to permit more frequent meetings and the employment of a liaison officer to work directly with the council, it could serve as a very effective means of interpreting the State hospital program to the general public."

"The State's program is so small that we have had little or no reason to call upon our advisory council; therefore, we have had little opportunity to find what role we feel they should play. It would seem, that a purely advisory role would be, at least in this State, the most beneficial. Our council consists of people from very scattered areas with great distances to be encountered when called to convene, which of course results in extreme difficulty in getting them together at any one specified time."

"The advisory council would be most valuable in interpreting the construction program to the public if it was informed and the present legal limitation amended to broaden the scope of this body."

"Not important when only a few projects are in progress."

## Some Comments Concerning Role of Councils

### *Role of Council When State Agency Is a Commission*

One or two of the States which have made little use of their councils are States in which the State agency is itself a commission which has wide representation of the various groups which should be represented on the council. Where this situation exists, an advisory council is probably superfluous. The commission performs all the functions that an advisory council would perform. It might seem, therefore, that in the basic Federal legislation setting forth the requirements for State plans, the requirement for an advisory council should not be mandatory when the State agency is organized as a commission with appropriate representation of producer and consumer interests. One State, where the administrative agency is a commission, has a large advisory council of 42 members and has apparently used this group skillfully, not so much to form policy but to publicize the State program and to familiarize all groups and regions of the State with the State program.

One or two other States—which have commissions but where the commissions did not have broad representation of the public, the medical profession, and the hospitals—have established advisory councils with good representation of the various groups concerned. These States have made good use of an advisory council and report that it is of great value.

### *Value of the Council in Relation to its Composition*

A few of the States apparently have had difficulty in using a council

or have found the council of relatively little value partly because the size or composition of the council has been faulty. A few of the States have established quite large councils, more than 20 individuals. Such councils, it would appear, are likely to be unwieldy and can hardly function as true advisory or policy forming bodies. It is noteworthy that two of these States—one with a council of 21 members and another with a council of 29 members—have established executive committees within their councils and the former meet when it is unnecessary to call the larger group together. Possibly both of these States would be better served by smaller councils. One State which has not made any real use of its council has a very small council (five members) which has insufficient representation of the general public and possibly of the medical profession.

From the replies of the States bearing upon the value of an advisory council as liaison or means of communication between the State agency and the various groups concerned with the program, it is obvious that a council cannot be of maximum value unless it has good representation of all the groups concerned with the program. A council which is overloaded with representatives of the hospitals and doctors may fall short in interpreting the program to labor and farm groups and the general public. Contrariwise, a council which is composed almost entirely of public representatives may fail in helping the State agency to get maximum cooperation and understanding from the medical profession and the hospitals.

### *Advisory and Policy Formulation Role of Council*

Apparently the line between a council's being advisory and participating in the formulation of policy is a faint one. When a State agency makes use of an advisory council and consults this council on all major policy matters, the members of the council inevitably expect that their advice will be followed. If the advice of the council is frequently disregarded, it is probable that the members will begin to feel that their time and trouble are of no avail, and the State agency will end up with no council worthy of the name. Where the State agency feels it wise usually to follow the recommendations of the council, as must probably be the case if an enduring working relationship is to exist, then the council, in effect, makes policy or participates in the making of policy.

## Summary and Conclusions

The advisory councils appointed by the States under the hospital survey and construction program tend in most States to give good representation to the primary groups interested in the program, namely, the general public, hospitals, and the medical profession.

However, in a few States there is inadequate representation of one or another group.

Most of the States have made good use of their councils. They have had from two to four meetings of the council annually and have asked the advice of the council on all major matters of policy. The vast majority of the States report that their councils have been of material value to them in carrying out the program.

An advisory council, well composed and well utilized, can be of great value to a State agency in the administration of a program which is of concern to important groups within the State and requires, for maximum success, good understanding and cooperation of the public and the health professions. A council composed of able individuals, who are broadly representative of the groups concerned, will aid the State agency in the development of wise policy; it will interpret to the State agency the needs and attitudes of the various groups represented and, in turn, will interpret the program to these groups. It can lend support and prestige to the program, give backing on controversial decisions, aid in obtaining broad public backing for the program, and assist in obtaining the passage of desired legislation.

A council which is well used tends, whatever its legal status, to become more than purely advisory. Since its recommendations are always or almost always followed, the council, in effect, participates in the formulation of policy.

# Preservation of Viability and Pathogenicity of the Nichols' Rabbit Strain of *Treponema pallidum* by Freeze Drying

By Edward G. Hampp, D.D.S., M.S.*

There is some evidence in the literature (Swift (*9*); Eagle (*4*); Oag (*5*); Turner et al. (*11*); Stavitsky (*8*); Probey (*6*)) that, unlike most bacteria and viruses, the spirochetes are not amenable to preservation by desiccation *in vacuo* from the frozen state. However, in 1947, Hampp (*3*) demonstrated that by appropriate methods *Borrelia vincentii* and cultured strains of alleged *Treponema pallidum* could be successfully preserved by the freeze-drying process. Since that time, all pure stock strains of oral spirochetes, including the smaller oral treponemes, have been maintained in this laboratory by this process. The success encountered with these spirochetes prompted the investigation of the possibility of this technique, or some modification of the method being applicable to the virulent Nichols' rabbit strain of *T. pallidum*.

Although we have been able to preserve satisfactorily the oral spirochetes and the Nichols' rabbit strain of *T. pallidum* in the frozen state with $CO_2$ ice by the method first described in 1938 by Turner (*10*) and subsequently advocated in 1950 by Rosebury and Frances (*7*) for the oral spirochetes, the advantages of being able to maintain spirochetes in the desiccated state are quite obvious from the standpoint of convenience and economy.

This paper presents a method which has been used with success for preservation of viability and pathogenicity of the virulent Nichols' rabbit strain of *T. pallidum* when dried *in vacuo* from the frozen state.

## Experimental

The strain of *T. pallidum* was obtained through the courtesy of T. F. Probey of the National Institute of Microbiology, National Institutes of Health. The strain of organisms was perpetuated during the experimental period by intratesticular inoculation at 4- to 6-week intervals in white rabbits raised and maintained at the National Institutes of Health.

For the purposes of this study, rabbit testes were removed aseptically

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at various stages of infection in attempts to preserve *T. pallidum* by freeze drying. In some cases, infected testes were enucleated during the period in which the orchitis had reached the stage of maximum swelling, induration, and edema; others were taken prior to the formation of an external chancre when circumscribed areas of induration were palpable within the organs, and still other testes were employed after ulceration had occurred through the scrotum. In certain instances, the tissues employed were macerated; in others, small pieces of testis or circumscribed nodular areas were used. These samples of tissue were suspended in normal rabbit serum, 5-percent gastric mucin,[1] and in the menstruum employed for drying cultures of oral spirochetes (*3*).

Control samples of the experimental material were inoculated into rabbits (1) prior to drying, (2) immediately after freezing in a dry ice-methyl cellosolve bath, and (3) after drying of tissues from the frozen state. In the first two instances, without exception, all specimens remained infectious for rabbits. However, it was found that when specimens were dried from the frozen state in the various menstra, the viability and virulence of *T. pallidum* were lost even though the time of being held frozen under vacuum and the time of drying following the removal of the freezing mixture from the samples were varied considerably. Darkfield examination of dried material reconstituted with physiologic salt solution showed spirochetes with a minimal amount of distortion and no demonstrable fragmentation, but no motility of the organisms could be demonstrated even though specimens were held at room temperature and at 37° C. for periods of 24 hours and examined at frequent intervals. It should be noted that it has been demonstrated under similar circumstances, in the case of oral spirochetes, that loss of motility is not necessarily an indication of loss of viability (*3*).

It was assumed from these initial experiments that the number of organisms present in the experimental specimens were insufficient to insure recovery of viable *T. pallidum* when subjected to the freeze-drying process. Therefore, it was decided to use whole testes to take advantage of all organisms present. The use of a suspending menstruum was discontinued since it was felt that the tissue fluids present in the edematous infected organs would act as a protective colloid.

The following procedure has resulted in the successful preservation of *T. pallidum* when dried *in vacuo* from the frozen state. Well developed, young male white rabbits with large testes were employed for purposes of inoculation. During these experiments rabbit passages of *T. pallidum* were made every 3 to 4 weeks to insure a good source of material. Darkfield microscopic examinations were made on all specimens employed for animal inoculation. Testes were re-

[1] Wilson's gastric mucin 701W.

moved at the height of the infection, usually 3 weeks following inoculation, and one of the organs was cut into small pieces with scissors, then macerated in a mortar with a pestle. Sufficient physiologic salt solution was added, usually 7 cc., and the material was further triturated until a semifluid emulsion was formed. A 60-mesh stainless steel screen mounted in a collar of the same metal was placed in a Buchner funnel and was used for filtering the saline emulsion under vacuum. Further fluid was expressed from the residual tissue on the screen by grinding it against the screen with a flat end ground glass rod three-fourths of an inch in diameter. The resulting filtrate contained very finely dispersed tissue, and 0.5 cc. was employed for inoculation of each testis of the experimental animal. A 2-inch, 20-gage needle was employed on a 2 cc. tuberculin syringe; the needle was inserted at the upper pole of the testis and carried the full length of the organ to its lower pole. The needle was slowly withdrawn, and at the same time the inoculum was deposited along its course. A few drops of inoculum was also deposited within the scrotum before removal of the needle.

The experimental animals were examined frequently until an orchitis became evident and then examined daily until the swelling of the organ was maximal and the tissues were grossly edematous. At this time the testes were greatly enlarged, usually 2 to 2½ times their normal size. This response occurred approximately at the end of the third week following inoculation. Darkfield examination of tissue fluids obtained from the testes revealed numerous spirochetes in each field observed. The animals were sacrificed by introduction of 25 cc. amounts of air into the marginal vein of the ear; the testes were removed under aseptic conditions and freed of their capsular material leaving the parenchyma of the organ exposed. A transverse cut about 4 mm. deep was made on one side of each testis in a mid position of the organ to facilitate drying of the tissue. Each organ was placed in a separate centrifuge tube, 3 cm. x 12 cm., prepared with a rubber stopper containing a small length of glass tubing to facilitate attachment to the drying apparatus. The containers were immediately connected to the machine, the chamber of which had been previously charged with $CO_2$ ice-methyl cellosolve mixture. The lower half of the tubes were then immersed in the same type freezing mixture and the testes frozen, then maintained for 7 hours with a vacuum of 5 microns of mercury. At the expiration of this period the tubes were placed in cracked $CO_2$ ice contained in an improvised ice chest; the tops of the tubes were permitted to protrude from the box to prevent frosting of their exhaust openings and were maintained in this manner for an additional 17 hours at a vacuum of 5 microns. At the expiration of this period the tubes were removed from the ice chest and the drying time continued for an additional

48 hours at the same vacuum. At this time the tubes were sealed off under vacuum and the material stored in a refrigerator at 8° C.

At the time of use, a dried testis was placed in a mortar and a small amount of saline added to moisten the dehydrated tissue. A saline emulsion was prepared in the same manner as previously described. Only sufficient saline was added, approximately 11 cc., to obtain about 3 to 4 cc. of filtered emulsion. It was found at this stage that trituration is extremely important so that the tissue may be finely ground and dispersed. The use of the metal screen and the grinding of the residual tissue against the screen during filtration is imperative to obtain a maximum yield of organisms in the filtrate along with finely dispersed tissue that would pass through a 20-gage hypodermic needle. Prior to use, the inoculum was examined by darkfield microscopy to ascertain roughly the concentration of organisms present and to observe any altered morphologic characteristics. Very little alteration in these characteristics and no demonstrable fragmentation were found. Suspensions were maintained at room temperature and at 37° C. for 24 hours and observed frequently for signs of motility which was not observed at any time. These findings again bear out the observations that motility is not necessarily an indication of viability. The inoculum was then introduced into rabbit testes by the methods previously described except for animal 5A and its mates, as noted in the table. Two rabbits were employed for each dried specimen tested; the size of the inoculum varied from 0.25 to 1.0 cc. of saline emulsion, and of this amount a few drops were deposited in the scrotum prior to the removal of the needle. All experimental animals were checked periodically both microscopically and grossly for evidence of infection.

## Results

The results of the animal virulence tests are documented in detail in the table. As noted, in previous experiments prior to the use of whole tests and of the 60-mesh screen when portions of testes or circumscribed nodules were employed for desiccation, only one rabbit, 5A, out of six was infected by rehydrated specimens containing *T. pallidum*. In this case only one testis was involved of a total of 12 organs. In all instances 0.25 cc. of inoculum was employed per testis as in the case of the seed rabbits. Following this experiment, whole testes were employed for desiccation from the frozen state, and a 60-mesh screen was used for preparation of the saline emulsion containing *T. pallidum*. In addition, the inoculum was increased to at least 0.5 cc. both in the preparation of testes for drying procedures and in the animal virulence tests following desiccation of *T. pallidum* containing testes.

Of the two rabbits in the second group, one animal, 11B, developed

symptoms of syphilis, and in this instance both testes were involved The total period of drying of the experimental testes was 48 hours and of this time the testes were in the methyl-cellosolve freezing mixture for 7 hours as in the case of rabbit 5A. Following this experiment, the testes were kept in the frozen state for 24 hours and then 48 hours without the freezing mixture as previously described.

As noted in the table, six rabbits, 201A–203B, were infected with *T. pallidum* obtained from dehydrated testes, and a total of 12 testes were involved. In order to obviate the chance that testicular tissue was incompletely dehydrated and the organisms might survive a short drying period, the elapsed time following dehydration of *T. pallidum* containing whole testes and the animal virulence test was purposely varied in these cases from 3, 58, and 66 days, respectively. In these instances all animals demonstrated a definite orchitis in a period ranging from 41 to 55 days following inoculation. It is evident that these incubation times are slightly in excess of the period required for infection when routine animal passages of *T. pallidum* are made.

Chesney (*2*), Wakerlin (*12*), and Bessemans, et al. (*1*) have shown that the smaller the number of *T. pallidum* contained in the inoculum the longer the incubation period and that once infection was initiated there was no marked effect upon the course of the disease in the experimental animals. These findings are comparable with the slightly prolonged incubation period encountered in these experiments and seemingly lends credence to the assumption that every precaution should be taken to obtain adequate quantities of *T. pallidum* for freeze drying to insure maximum yield of organisms in reconstituted testicular emulsions for animal virulence tests.

Those animals that did not succumb to infection by *T. pallidum* dried from the frozen state were observed for 6 to 7 months and at frequent intervals were examined both grossly and microscopically without demonstrating evidence of infection.

From the results presented, it cannot be overemphasized that every precaution should be taken in attempting to obtain relatively large numbers of organisms if success is to be obtained in the preservation of viability and pathogenicity of *T. pallidum* by drying *in vacuo* from the frozen state. Special consideration should be given to the selection of infected testes, preparation of tissue emulsions, method of inoculation of animals, and use of a large amount of inoculum for the animal virulence test.

Further studies are in progress to determine the length of time *T. pallidum* will survive following drying in a vacuum from the frozen state.

## Summary

A method is presented for the preservation of viability and pathogenicity of the Nichols' rabbit strain of *T. pallidum* when dried *in*

*vacuo* from the frozen state. The methods employed and the results obtained are described in detail.

*Infectivity of* Treponema pallidum *following drying* in vacuo *from the frozen state*

| Number of rabbits inoculated | Number of dried testes employed for inoculation | Type of dried samples | Total time of drying | Microscopic examinations of inoculum [1] | Time elapsed following drying | Quantity of inoculum per testis | Results: Rabbits, Negative | Results: Rabbits, Positive | Results: Testes, Positive | Time required to become positive | Observation period of negative rabbits | Reference number of positive rabbits |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | *Hours* | | *Days* | *Cc.* | | | | *Days* | *Mos.* | |
| 6 | 3 | Circumscribed nodule | 24 | † | 7 | 0.25 | 5 | 1 | 1 | 50 | 7 | 5A |
| 2 | 1 | Whole testes | 48 | †† | 3 | .5 | 1 | 1 | 2 | 49 | 6 | 11B |
| 2 | 1 | Whole testes | 72 | †††† | 66 | .5<br>1.0 | 0<br>0 | 1<br>1 | 2<br>2 | 41<br>41 | | 201A<br>201B |
| 2 | 1 | Whole testes | 72 | †† | 58 | .5 | 0<br>0 | 1<br>1 | 2<br>2 | 48<br>48 | | 202A<br>202B |
| 2 | 1 | Whole testes | 72 | †††† | 3 | .5 | 0 | 1 | 2 | 55<br>[2]55 | | 203A<br>203B |

[1] Plus signs are arbitrary designation of relative spirochetal concentrations in the inoculum; 1† being few organisms per field, 4† numerous spirochetes per field.
[2] Orchitis in left testis at 55 days; the right testis exhibited an orchitis at 76 days.

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# Incidence of Disease

*No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring*

## UNITED STATES

### Reports From States for Week Ending March 31, 1951

*Influenza*

The following reports have been prepared in collaboration with the Influenza Information Center of the National Institutes of Health.

The total number of cases reported for the current week was 8,982 compared with the 12,699 for the previous week and 13,259 cases for the same week last year. However, deaths from all causes reported in major cities of the United States were significantly greater for the current week compared with the 3-year median in the following areas: New England, 12.3 percent; Middle Atlantic, 4.5; East North Central, 9.8; and the Pacific, 9 8.

Dr. T. P. Magill, Director of the Strain Study Center, New York State University Medical Center, Brooklyn, has reported on the antigenic analysis of 20 strains of influenza virus isolated in the winter of 1950–51, from the British Isles, Western Europe, and the United States, and has compared them with strains isolated in previous winters. Eighteen of the recently isolated strains differed from the earlier A-prime strains in that although hemagglutination was inhibited to a fairly marked degree by the FM–1 and Nederland 1/49 antiserum, it was not inhibited by the Coamo antiserum. That is, the 1950–51 strains with two exceptions seemed to have lost the Coamo "component" but retained the FM–1 and Nederland 1/49 "component."

Dr. Albert Milzer, Collaborating Laboratory, Michael Reese Hospital, Chicago, reports a significant rise in complement-fixing antibody titer against the FM–1 strain of influenza A-prime virus in two patients recently ill. One patient had an influenzalike illness, and the second was clinically diagnosed as having atypical pneumonia. Sera from two other patients showed evidence of influenza A and influenza B infections.

Dr. Edwin H. Lennette, Director of the Regional Laboratory in Berkeley, Calif., reports serologic evidence by the complement fixation test for influenza in 20 patients tested from March 17 to 23.

Dr. C. R. Freeble, Jr., Ohio Department of Health, reports an

explosive outbreak of upper respiratory disease, presumably influenza, among students at Bowling Green State University. The outbreak appeared early in March with subsequent cases building up, and in the opinion of Dr. J. W. Halfhill of the Student Health Services, the peak had not been reached by March 31. Approximately 400 cases have been observed. Onset of illness was usually sudden, with cough and general aching. Leukopenia was common. Serum specimens are being obtained for hemagglutination inhibition testing.

*Other Diseases*

There was a slight increase in reported cases of measles for the current week, 19,471, compared with the previous week, 17,546. These figures exclude Idaho for which no report was received. One case of anthrax was reported in each of three States—Massachusetts, Connecticut, and Pennsylvania.

## Epidemiological Reports

*Diphtheria*

Dr. J. P. Ward, Director, Arizona Department of Health, reports that 21 cases of diphtheria have occurred in three communities within a 20-mile radius in the southeastern part of Yuma County near the Mexican border. The onset of the first case was February 23 and the last was March 25. There have been no deaths. Cases were diagnosed bacteriologically and clinically.

Dr. R. O. Saxvik, South Dakota State Health Officer, reports an outbreak of eight cases of diphtheria in a State School for the Feeble Minded during the week ended March 30. All cases were reported to have had a preliminary upper respiratory infection and positive cultures were obtained from nasal discharges. None had evidence of diphtheritic membrane. Several children had elevations of temperature to 105°. All cases were in children between 1 and 10 years of age.

*Infectious Hepatitis*

Dr. A. W. Freeman, Maryland Department of Health, reports a marked increase in the number of reported cases of infectious hepatitis since January 1. Ten cases were reported in January, and 15 in February compared with a total of 38 cases during all of 1950. One outbreak in 1951 occurred in a State institution where 10 to 12 cases were observed. Another small outbreak occurred in northeast Maryland among children between the ages of 7 and 13 years, attending a white elementary school.

*Rabies*

Dr. George W. Cox, Texas State Health Officer, reports that rabies in foxes is spreading eastward toward the Louisiana border. Another

focus of infection is in central Texas counties. In one county, more than 30 persons have been given antirabies vaccine in the last few weeks.

*Psittacosis*

Dr. Albert Milzer of the Michael Reese Hospital, Chicago, has reported psittacosis infection in two individuals presenting the physical findings of severe atypical pneumonia. It was reported that one of the patients had contact with a parakeet. Diagnosis was made by serologic evidence of an increase in antibodies against the psittacosis group of viruses.

***Comparative Data For Cases of Specified Reportable Diseases: United States***

[Numbers after diseases are International List numbers, 1948 revision]

| Disease | Total for week ended— | | 5-year median 1946–50 | Seasonal low week | Cumulative total since seasonal low week | | 5-year median 1945–46 through 1949–50 | Cumulative total for calendar year— | | 5-year median 1946–50 |
|---|---|---|---|---|---|---|---|---|---|---|
| | Mar. 31, 1951 | Apr. 1, 1950 | | | 1950–51 | 1949–50 | | 1951 | 1950 | |
| Anthrax (062) | 3 | 2 | 2 | (1) | (1) | (1) | (1) | 20 | 7 | 13 |
| Diphtheria (055) | 110 | 110 | 179 | 27th | 4,115 | 6,281 | 9,083 | 1,208 | 2,010 | 2,725 |
| Encephalitis, acute infectious (082) | 16 | 13 | 11 | (1) | (1) | (1) | (1) | 187 | 167 | 106 |
| Influenza (480–483) | 8,982 | 13,259 | 1,908 | 30th | 104,740 | 116,358 | 116,358 | 90,198 | 105,774 | 105,774 |
| Measles (085) | 19,471 | 10,964 | 23,784 | 35th | 205,117 | 116,235 | 234,152 | 176,416 | 97,105 | 199,206 |
| Meningitis, meningococcal (057.0) | 98 | 118 | 82 | 37th | 2,365 | 2,144 | 2,089 | 1,404 | 1,230 | 1,119 |
| Pneumonia (490–493) | 2,047 | 3,089 | ------- | (1) | (1) | (1) | (1) | 26,201 | 33,798 | ------- |
| Poliomyelitis, acute (080) | 46 | 62 | 24 | 11th | 87 | 124 | 55 | 1,299 | 1,255 | 680 |
| Rocky Mountain spotted fever (104) | ------- | 1 | ------- | (1) | (1) | (1) | (1) | 4 | 12 | 12 |
| Scarlet fever (050) [2] | 2,125 | 1,752 | 2,783 | 32d | [3] 45,428 | 39,764 | 59,516 | [3] 29,737 | 23,325 | 35,869 |
| Smallpox (084) | ------- | 4 | 4 | 35th | [4] 13 | 38 | 54 | [4] 5 | 17 | 33 |
| Tularemia (059) | 20 | 15 | 15 | (1) | (1) | (1) | (1) | 188 | 287 | 287 |
| Typhoid and paratyphoid fever (040,041) [5] | 55 | 44 | 49 | 11th | 85 | 92 | 93 | 520 | 602 | 573 |
| Whooping cough (056) | 1,311 | 2,810 | 1,881 | 39th | 42,070 | 55,381 | 55,381 | 20,468 | 33,845 | 28,738 |

[1] Not computed.
[2] Including cases reported as streptococcal sore throat.
[3] Addition: Arkansas, week ended Mar. 24, 9 cases.
[4] Deduction: Idaho, week ended Mar. 3, 1 case.
[5] Including cases reported as salmonellosis.

NOTE.—Data exclude report from Idaho for week ended Mar. 31, for which no report was received.

## Reported Cases of Selected Communicable Diseases: United States, Week Ended Mar. 31, 1951

[Numbers under diseases are International List numbers, 1948 revision]

| Area | Diphtheria (055) | Encephalitis, infectious (082) | Influenza (480–483) | Measles (085) | Meningitis, meningococcal (057.0) | Pneumonia (490–493) | Poliomyelitis (080) |
|---|---|---|---|---|---|---|---|
| **United States** | **110** | **16** | **8,982** | **19,471** | **98** | **2,047** | **46** |
| **New England** | **3** | **2** | **759** | **671** | **4** | **157** | **2** |
| Maine | - | - | 139 | 5 | - | 33 | - |
| New Hampshire | - | - | 94 | 34 | 1 | 18 | - |
| Vermont | - | - | 10 | 76 | - | - | - |
| Massachusetts | 3 | 2 | - | 481 | 1 | - | 2 |
| Rhode Island | - | - | 1 | 1 | - | 5 | - |
| Connecticut | - | - | 515 | 74 | 2 | 101 | - |
| **Middle Atlantic** | **6** | **4** | **151** | **2,315** | **11** | **324** | **3** |
| New York | 2 | 3 | [1] 44 | 890 | 7 | 90 | 3 |
| New Jersey | - | 1 | 107 | 502 | 1 | 108 | - |
| Pennsylvania | 4 | - | - | 923 | 3 | 126 | - |
| **East North Central** | **8** | **1** | **192** | **3,172** | **14** | **209** | **4** |
| Ohio | 2 | - | - | 871 | 2 | - | 2 |
| Indiana | 4 | - | 19 | 164 | - | 13 | - |
| Illinois | 1 | 1 | 26 | 764 | 7 | 102 | 2 |
| Michigan | - | - | 147 | 474 | 5 | 94 | - |
| Wisconsin | 1 | - | - | 899 | - | - | - |
| **West North Central** | **16** | **1** | **43** | **1,136** | **13** | **49** | **2** |
| Minnesota | 1 | - | 13 | 224 | 3 | 7 | 1 |
| Iowa | - | - | - | 20 | 2 | 1 | - |
| Missouri | - | - | 5 | 352 | 6 | - | - |
| North Dakota | 14 | 1 | 23 | 126 | - | 35 | - |
| South Dakota | - | - | - | 15 | 1 | 1 | - |
| Nebraska | - | - | - | 13 | 1 | - | 1 |
| Kansas | 1 | - | 2 | 386 | - | 5 | - |
| **South Atlantic** | **27** | - | **3,380** | **1,580** | **16** | **283** | **9** |
| Delaware | - | - | 41 | 21 | - | - | - |
| Maryland | 5 | - | 10 | 124 | 1 | 28 | - |
| District of Columbia | - | - | 4 | 58 | 1 | 27 | - |
| Virginia | 4 | - | 1,027 | 665 | 3 | 125 | - |
| West Virginia | 1 | - | 1,596 | 161 | 5 | 40 | 1 |
| North Carolina | 12 | - | - | 127 | 2 | - | 1 |
| South Carolina | 2 | - | 231 | 39 | 2 | 36 | 1 |
| Georgia | 2 | - | 471 | 312 | 2 | 27 | - |
| Florida | 1 | - | - | 73 | - | - | 6 |
| **East South Central** | **11** | - | **664** | **721** | **14** | **194** | **8** |
| Kentucky | 3 | - | 532 | 392 | 7 | 51 | 1 |
| Tennessee | 2 | - | 80 | 121 | 2 | - | - |
| Alabama | 6 | - | - | 133 | 4 | 108 | 2 |
| Mississippi | - | - | 52 | 75 | 1 | 35 | 5 |
| **West South Central** | **13** | **5** | **954** | **4,371** | **15** | **576** | **6** |
| Arkansas | 3 | - | 648 | 423 | 1 | 79 | - |
| Louisiana | - | - | 8 | 37 | 3 | 17 | 1 |
| Oklahoma | - | - | 298 | 460 | 1 | 57 | 1 |
| Texas | 10 | 5 | - | 3,451 | 10 | 423 | 4 |
| **Mountain** | **20** | - | **1,558** | **1,407** | **2** | **134** | **4** |
| Montana | 1 | - | 38 | 72 | - | 2 | 1 |
| Idaho | (2) | (2) | (2) | (2) | (2) | (2) | (2) |
| Wyoming | - | - | - | 54 | 1 | 5 | - |
| Colorado | 1 | - | 18 | 566 | - | 23 | - |
| New Mexico | 1 | - | 14 | 38 | 1 | 29 | 1 |
| Arizona | 17 | - | 1,486 | 569 | - | 75 | 2 |
| Utah | - | - | - | 87 | - | - | - |
| Nevada | - | - | 2 | 21 | - | - | - |
| **Pacific** | **6** | **3** | **1,281** | **4,098** | **9** | **121** | **8** |
| Washington | - | - | 248 | 1,005 | 4 | 4 | 3 |
| Oregon | 3 | - | 680 | 348 | 1 | 49 | - |
| California | 3 | 3 | 353 | 2,745 | 4 | 68 | 5 |
| Alaska | - | - | 17 | - | - | 4 | 1 |
| Hawaii | - | - | 18 | 3 | - | 1 | - |

[1] New York City only. [2] Report not received.

*Anthrax:* Connecticut, Massachusetts, and Pennsylvania, 1 case each.

## Reported Cases of Selected Communicable Diseases: United States, Week Ended Mar. 31, 1951—Continued

[Numbers under diseases are International List numbers, 1948 revision]

| Area | Rocky Mountain spotted fever (104) | Scarlet fever (050) | Small-pox (084) | Tularemia (059) | Typhoid and paratyphoid fever [1] (040, 041) | Whooping cough (056) | Rabies in animals |
|---|---|---|---|---|---|---|---|
| **United States** | | 2,125 | | 20 | 55 | 1,311 | 182 |
| **New England** | | 191 | | | | 98 | |
| Maine | | 7 | | | | 23 | |
| New Hampshire | | [2] 19 | | | | 3 | |
| Vermont | | 3 | | | | 3 | |
| Massachusetts | | 133 | | | | 52 | |
| Rhode Island | | 5 | | | | 14 | |
| Connecticut | | 24 | | | | 3 | |
| **Middle Atlantic** | | 363 | | | 29 | 183 | 20 |
| New York | | [2] 209 | | | 29 | 62 | 16 |
| New Jersey | | 58 | | | | 62 | |
| Pennsylvania | | 96 | | | | 59 | 4 |
| **East North Central** | | 767 | | 7 | 2 | 168 | 20 |
| Ohio | | 164 | | | | 41 | |
| Indiana | | 52 | | | 2 | 6 | 17 |
| Illinois | | 147 | | 7 | | 30 | 2 |
| Michigan | | 341 | | | | 50 | 1 |
| Wisconsin | | 63 | | | | 41 | |
| **West North Central** | | 115 | | 3 | | 83 | 44 |
| Minnesota | | 22 | | | | 7 | 1 |
| Iowa | | 16 | | | | 12 | 12 |
| Missouri | | 38 | | 3 | | 15 | 31 |
| North Dakota | | | | | | 4 | |
| South Dakota | | 3 | | | | | |
| Nebraska | | 8 | | | | 2 | |
| Kansas | | 28 | | | | 43 | |
| **South Atlantic** | | 189 | | 2 | 8 | 240 | 30 |
| Delaware | | | | | | 1 | |
| Maryland | | 18 | | | | 13 | |
| District of Columbia | | 12 | | | 1 | 3 | |
| Virginia | | 34 | | 1 | 1 | | 2 |
| West Virginia | | 17 | | | | 100 | 3 |
| North Carolina | | 72 | | | 1 | 78 | |
| South Carolina | | 6 | | | | 11 | 18 |
| Georgia | | 11 | | | 4 | 19 | 7 |
| Florida | | [2] 19 | | 1 | 1 | 15 | |
| **East South Central** | | 100 | | 2 | 3 | 62 | 32 |
| Kentucky | | 47 | | | | 16 | 17 |
| Tennessee | | 40 | | | 2 | 7 | 13 |
| Alabama | | 7 | | | 1 | 27 | |
| Mississippi | | 6 | | 2 | | 12 | 2 |
| **West South Central** | | 122 | | 4 | 8 | 280 | 30 |
| Arkansas | | 3 | | 2 | 2 | 38 | 2 |
| Louisiana | | 4 | | 1 | 1 | 1 | |
| Oklahoma | | 64 | | | | 12 | |
| Texas | | 51 | | 1 | 5 | 229 | 28 |
| **Mountain** | | 133 | | 2 | 3 | 116 | 3 |
| Montana | | 12 | | | | | 3 |
| Idaho | ([3]) | ([3]) | ([3]) | ([3]) | ([3]) | ([3]) | ([3]) |
| Wyoming | | | | | | 2 | |
| Colorado | | 13 | | | 1 | 30 | |
| New Mexico | | 3 | | | | 23 | |
| Arizona | | 5 | | | 2 | 58 | |
| Utah | | [2] 100 | | 2 | | 3 | |
| Nevada | | | | | | | |
| **Pacific** | | 145 | | | 2 | 81 | 3 |
| Washington | | 108 | | | | 30 | 2 |
| Oregon | | 37 | | | 1 | 6 | |
| California | | ([3]) | | | 1 | 45 | 1 |
| Alaska | | | | | | 1 | |
| Hawaii | | 2 | | | | | |

[1] Including cases reported as salmonellosis. [2] Including cases reported as streptococcal sore throat.
[3] Report not received.

# FOREIGN REPORTS

## CANADA

*Reported Cases of Certain Diseases—Week Ended March 17, 1951*

| Disease | Total | Newfoundland | Prince Edward Island | Nova Scotia | New Brunswick | Quebec | Ontario | Manitoba | Saskatchewan | Alberta | British Columbia |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Brucellosis | 4 | | | | | 3 | | | | | 1 |
| Chickenpox | 939 | | | 45 | | 192 | 445 | 34 | 17 | 78 | 128 |
| Diphtheria | 2 | | | | | | 1 | | 1 | | |
| Dysentery, bacillary | 11 | | | | | 5 | 3 | 1 | | | 2 |
| Encephalitis, infectious | 1 | | | | | | 1 | | | | |
| German measles | 431 | | | 116 | | 38 | 187 | | 4 | 27 | 59 |
| Influenza | 1,678 | 65 | | 180 | 16 | | 137 | 206 | 132 | | 942 |
| Measles | 1,506 | 8 | | 66 | 105 | 403 | 737 | 140 | 4 | 17 | 26 |
| Meningitis, meningococal | 10 | | | 1 | 1 | 1 | 3 | 1 | | | 3 |
| Mumps | 914 | | | 16 | | 214 | 300 | 58 | 65 | 140 | 121 |
| Scarlet fever | 229 | 1 | | 4 | | 75 | 50 | 31 | 2 | 23 | 43 |
| Tuberculosis (all forms) | 225 | 12 | | 3 | 15 | 139 | 32 | 8 | 9 | 7 | |
| Typhoid and paratyphoid fever | 7 | | | | | 5 | | | | 1 | 1 |
| Venereal diseases: | | | | | | | | | | | |
| Gonorrhea | 223 | 3 | | 14 | 4 | 48 | 48 | 17 | 4 | 43 | 42 |
| Syphilis | 104 | 3 | | 2 | 3 | 64 | 19 | 1 | 2 | 6 | 4 |
| Primary | 8 | 1 | | | | 4 | 3 | | | | |
| Secondary | 4 | 1 | | 1 | | 1 | | | | 1 | |
| Other | 92 | 1 | | 1 | 3 | 59 | 16 | 1 | 2 | 5 | 4 |
| Whooping cough | 111 | | | | | 15 | 50 | 18 | 4 | 5 | 19 |

## REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

The following reports include only items of unusual incidence or of special interest and the occurrence of these diseases, except yellow fever, in localities which had not recently reported cases. All reports of yellow fever are published currently. A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

### Cholera

*Burma.* During the week ended March 24, 1951, 14 cases of cholera were reported in Moulmein as compared with 24 for the previous week.

### Smallpox

*India.* Indications are that the smallpox epidemic is subsiding in India. For the week ended March 24, 1951, all ports reporting on smallpox showed a decrease in reported cases from the previous week. Ports reporting large numbers were as follows: Calcutta (516 cases), Madras (119), Bombay (74), Visakhapatnam (11), and Cocanada (8). During the week ended March 17, 51 cases were reported in Nagpur.

*Indonesia.* For the week ended March 17, 1951, five cases of smallpox were reported in Java—three in Semarang and two in Tjilatjap.

*Japan.* During the week ended March 10, 1951, one imported case of smallpox was reported in Yokohama. For the week ended March 17, one case was reported in Tokyo and for the week ended March 24, one case was reported in Fukuoka.

*Pakistan.* For the week ended March 24, 1951, smallpox was reported in ports as follows: Karachi, five cases; Lahore, three; and Chittagong, one.

**Typhus Fever**

*Mexico.* For the week ended March 3, 1951, typhus fever was was reported in Mexico as follows: Mexico City, four cases; Monterrey, two (murine), and Merida, one. During the week ended February 24, one case of murine typhus fever was reported in Tampico.

+ + +

The printing of this publication [illegible] been approved by the Director of the Bureau of the Budget (August [illegible]).

The PUBLIC HEALTH REPORTS, first published in 1878 under authority of an act of Congress of April 29 of that year, is issued weekly by the Public Health Service through the Division of Public Health Methods, pursuant to the following authority of law: United States Code, title 42, sections 241, 245, 247; title 44, section 220.

It contains (1) current information regarding the incidence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

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# Public Health Reports

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FEDERAL SECURITY AGENCY

PUBLIC HEALTH SERVICE

FEDERAL SECURITY AGENCY
*Oscar R. Ewing, Administrator*

PUBLIC HEALTH SERVICE
*Leonard A. Scheele, Surgeon General*

Division of Public Health Methods
*G. St. J. Perrott, Chief of Division*

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# Public Health Reports

*Vol. 66* • APRIL 27, 1951 • *No. 17*

## Public Health Nursing: 1951

### Summary of the Conference of State Directors of Public Health Nursing

By PEARL McIVER and RUTH G. TAYLOR*

The 1951 Conference of State Directors of Public Health Nursing, held March 12–19 in Washington, centered on the national defense emergency and the special problems arising from expanding civil defense activities.

The urgent demands of civil defense are, of course, felt by the State Directors of Public Health Nursing since virtually every public health program involves public health nursing

Long before the Conference opened, State directors listed topics they wanted to discuss through their steering committee: Amy L. Fisher, North Carolina; Portia Irick, New Mexico; Helen Kinney, Missouri; and Mary E. Parker, New York. Committees of the Division of Health Services of the Children's Bureau and the Division of Public Health Nursing of the Public Health Service, Federal Security Agency, built the Conference program accordingly.

Leading authorities in a number of fields set the stage for the Conference with their talks at the general session. Delegates got down to cases at the follow-up work group sessions.

#### *Authoritative Speakers*

To give the directors a panoramic view at the opening program, Frieda S. Miller spoke on The Availability and Use of Womanpower in the Emergency. Miss Miller is Director of the Women's Bureau, United States Department of Labor. She emphasized that:

- While the role women play in the economy of the United States has grown to an ever-increasing extent, their contribution will be even more vital in the present emergency.

*Chief, Division of Public Health Nursing, Public Health Service, and Chief, Nursing Section, Children's Bureau. Federal Security Agency

• Long-term trends as well as emergency needs should be considered in the planning of programs for women workers.

• Almost 33 percent of the women in the population are working women.

• The 38 million women not working now form the largest reserve from which additional workers could be drawn. But not all of these women would be available for employment.

• One of the most striking developments in recent years has been the increase in the number of married women workers. At present married women form almost 51 percent of all working women. Ten years ago married women accounted for but 36 percent.

*Demand for Nurses*

The other half of the opening session was on Use of Nurse Power—Ruth B. Freeman's subject. Miss Freeman is Nursing Consultant with the National Security Resources Board and Associate Professor of Public Health Administration and head of the school of hygiene at Johns Hopkins University. She brought home such points as:

• The United States will need almost 100,000 more nurses by 1960 to meet the growing demands for professional nurses in public health, hospitals, industry, and physicians' offices and to take care of the expanding population.

• One out of every 10 girls graduating from high school must be recruited as a nurse if the Nation's needs are to be met.

• The use of nurse power is a continuing rather than an emergency problem, and it is not realistic to count on the 205,000 inactive nurses to fill unmet needs. Of the total now inactive, 87 percent are married; 57 percent have children under 18; 10.6 percent are over 50 years old.

• Every fact and factor in today's situation shows us undeniably that maximum use of nurse power is of tremendous importance to the Nation, to every organization or agency employing nurses, and to the individual nurse herself.

• We must husband nursing skills, not only to safeguard the public but also to maintain the great public confidence in the nursing profession.

*Continuing Progress*

One Conference session was devoted to Improvement of Nursing Service with Marian Sheahan the principal speaker. Miss Sheahan, Director of Programs for the National Committee for the Improvement of Nursing Service, emphasized that:

• The two main factors in improved nursing service are: (1) better qualified nurses; (2) better use of nursing skills.

• Better qualified nurses mean improved schools of nursing, and better schools can only be had through better prepared faculties and

through regional planning to get maximum use of available clinical facilities.

- The need for financial aid to schools of nursing is urgent.
- Improved administrative methods, in-service training programs, and better personnel policies are ways to improve the use of nurse power. Several plans are being developed jointly with allied professional organizations, such as the American Hospital Association, for achieving these goals.

Anna Fillmore, General Director, National Organization for Public Health Nursing, pointed out specifically how the NOPHN is working to improve public health nursing service. Lucile Petry, Chief Nurse Officer, Public Health Service, discussed the subject from the point of view of regional planning for educational purposes.

*Building Examinations*

Lillian D. Long and Dorothy Deming talked to the directors about the work in objective tests being done by the American Public Health Association's merit system service. Dr. Long is Associate Director of the service and Miss Deming is their Public Health Nursing Consultant. In their discussion of Techniques in the Selection of Personnel they noted that:

- In public health nursing alone 64 different tests are available, ranging from graduate nurse to State director of public health nursing. The merit system service can draw from a stock of 4,000 questions when preparing nurses' examinations, which cover the fields of basic, surgical, public health, orthopedic nursing; materia medica; communicable and noncommunicable diseases; maternal and infant care; child, mental, and oral health; nutrition; health education; and records and reports.
- Around 2,000 applicants for nurse positions in State health departments have taken these tests during the last 3 years.

*Nursing in Medical Care Plans*

Nursing service is an essential part of medical care and should be included in medical insurance plans, Alma Haupt told State directors. Miss Haupt is Director of the Metropolitan Life Insurance Co.'s Nursing Bureau and chairman of a joint committee on nursing in medical care plans of the American Nurses Association and National Organization for Public Health Nursing.

Dr. C. L. Williams, Chief of the Bureau of State Services, Public Health Service, observed that while the actual number of professional health people is greater today than ever before, the numerical gains are more than offset by increased demands for health workers and stronger competition for their services. He added that States which have not brought their salary scales up to the general standards of the country will find themselves in a shortage situation.

### *Recalls White House Conference*

At the follow-up session on the Mid-Century White House Conference on Children and Youth (held last December in Washington) officials of the Children's Bureau reported on some of the maternal and child health problems that face the country today.

Dr. Edwin F. Daily, Director of the Division of Health Services, pointed to the need for reexamination of time devoted to routine medical and dental inspections in the Nation's schools. Preliminary screening of children by teachers, nurses, or technicians to find those with disabilities would give the doctors more time to care for children in greatest need.

Commenting on the shift in the general thinking on crippled children's programs, Dr. Daily said that at first State programs concentrated on children with orthopedic defects. Now they are putting more emphasis on such child handicaps as rheumatic fever, epilepsy, and hearing conditions. He pointed out that:

- It is time to reconsider the extent to which hospital maternity nurses could assume more responsibility for patients during labor, delivery, and in postpartum care in view of the possibility of a shorter supply of medical manpower due to the emergency.
- A shortage of hospital beds and the high cost of hospital care are two factors in the incredibly short periods of hospitalization of some maternity cases. One study showed that average cost of hospital care has climbed to between $15 and $20 a day.
- The importance of the prenatal diet of mothers as a factor in the health and survival of infants at birth and during the first year of life points up the need for more attention to nutritional aspects of pregnancy.

### *Need for Serenity*

Katharine F. Lenroot, Chief of the Children's Bureau, called on nurses to be the "community's eyes and ears" in recognizing problems during the emergency.

Noting that the Bureau is getting questions now about the emotional effect on children of drills for protection in case of an atomic bomb attack, she said that children whose parents are serene and able to face life with courage have an underlying security that they can achieve in practically no other way. Parents whose guidance in regard to safety, whether from burglars, fire, drowning, or disease, has been calm, rather than frantic and fear producing, will probably find no great harm resulting to their children from the education schools are giving on A-bomb protection. Such education can become as routinely accepted as fire drills or practice in traffic rules.

Miss Lenroot expressed the hope that there will be no active recruiting of mothers of young children as the Nation gears itself for

defense. If pending legislation to authorize day care in areas affected by mobilization should pass, Miss Lenroot said that children under 3 years old probably should not be cared for in day-care centers, but in foster-family homes.

Miss Lenroot discussed the Savannah River atomic bomb project in relation to the problem of community services which need to be provided in this and other areas congested by defense preparation. Important questions are how to measure the impact of the increased population in terms of additional health, welfare, and education services; how to help build good relationships between the older and the newer inhabitants in what promises to be a large in-migration.

### *Emphasis on Research*

Melvin Glasser, Executive Director of the White House Conference who was recently named as an Associate Chief of the Children's Bureau, said:

- It is about time we spent as much on child research as we spend on research in television.

- In the bluntest terms, we cannot afford the waste inherent in programs which do not use available knowledge to the fullest.

### *Timing is Important*

A highlight of the session, arranged by Ruth G. Taylor, Chief of the Nursing Section of the Children's Bureau, was an address by Dr. Samuel Wishik, Director of the Bureau of Child Health, New York City Health Department.

The timing of the child's growth is more important than anything else, Dr. Wishik said, because what is right at one time is wrong at another. Just knowing that children do certain things is meaningless unless you know how old the child is and whether it is appropriate to him at his own stage of development.

He discussed the stages in the growth and development of a child (described in the Fact Finding Report of the White House Conference) and how children need to be helped to acquire a sense of trust, autonomy, initiative, accomplishment, identity, and integrity. Nurses and doctors can assist parents to develop these qualities in their children.

### *Up for Consideration*

Other significant problems—all stepped up by the emergency—which State directors discussed included:

- Need for more local or district supervisory nurses to guide inexperienced public health nurses who are assigned to rural areas.

- Increased demand by basic schools of nursing for State public health nurses to give students a broader understanding of public health.

- Need for increased field training facilities for orientation of new staff members, basic nursing students, university public health students.
- Need to stimulate regional planning in order to provide improved educational facilities.
- Need to study the activities of public health nursing to determine how many and what kind of nurses are required for the various functions which make up complete nursing services and to keep step with changing programs. The American Nurses Association is sponsoring a series of studies on hospital nursing services, but may not get to public health nursing services for several years.
- Need for use of nursing skills on jobs demanding them—with auxiliary help for nonprofessional work.
- Expanded recruitment for both basic nursing students and public health nurses.
- Methods for analyzing nursing service in programs to justify use of categorical funds for generalized services.

### *Combination Services Study*

The National Organization for Public Health Nursing's newly published Study of Combination Services in Public Health Nursing is now available at NOPHN, Miss Fillmore told the directors. The combination of services in public health nursing is the system in which all public health nurses in a town—both in official and nonofficial agencies—work under one agency. About 25 cities throughout the United States are using the system. In some of the towns, all public health nurses work from the local health department. In others, the local visiting nurse service is the operating agency.

### *Officers of Council*

President of the State Directors' Council is Anna R. Moore, Washington; vice president, Rena Haig, California; secretary, Helen Dunn, Maine.

Beginning in 1953, officers will be elected for 2-year terms at the Biennial Conference in Washington. Since 1936, State directors have met annually—a day ahead of the American Public Health Association meetings. At their 1948 session they voted to initiate biennial work conferences with the Children's Bureau and the Public Health Service, pending approval of the Association of State and Territorial Health Officers. The first Biennial Conference was held in 1949.

State directors were welcomed to the 1951 Conference by John L. Thurston, Federal Security Assistant Administrator; Surgeon General Leonard A. Scheele, Public Health Service, and Katharine F. Lenroot, Chief of the Children's Bureau.

# The Significance of the Early Diagnosis of Hearing Impairment in Children

By John E. Bordley, M.D. and William G. Hardy, Ph.D.*

Both public health and school authorities are becoming more and more interested in children with hearing impairment. Chemotherapy, irradiation, advances in electronics, and fresh concepts in educational methods now provide means for prevention of certain types of hearing impairment and a degree of rehabilitation in others that was not possible a few years ago. Preventive efforts are most rewarding during childhood, particularly in the large group who have temporary impairment of hearing or recurring attacks of otitis media at frequent intervals during the winter months. The problem here is to recognize and control any allergy these children may have, remove all hyperplastic lymphoid tissue around the orifice of the Eustachian tubes, and, if necessary, give small doses of aureomycin or some other antibacterial drug throughout the winter months to try to prevent colds. Recurring colds with blocking of the Eustachian tubes lead to changes in the middle ear that interfere with the passage of sound to the cochlea, and, if often repeated, these changes become irreversible.

It is of paramount importance for the individual and for the community of which he is a part that the child with impaired hearing which cannot be reversed begin the necessary auditory, speech, and language training. This requires careful audiologic work and parental guidance so that from the outset the child may be given language and related behavior training that follow normal developmental patterns as closely as possible. The child with a severe hearing impairment is not per se irredeemably strange, or peculiar, or different, and he should not be relegated automatically to a socially segregated state.

To carry out this program on both preventive and rehabilitative levels requires the cooperation of school and health authorities with the audiologist, otologist, pediatrician, and, in some cases, the allergist and psychiatrist.

## Extent of Hearing Impairment in Children

There is wide variance of statistics on the frequency of hearing impairment in children. Much of the data is of dubious accuracy, how-

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ever, because of variations in the techniques of testing, the lack of control over acoustic conditions in the testing environment, mistaking a temporary hearing loss for a permanent impairment, and the relative instability of all subjective test responses in young children. Screening-test techniques are improving, and some of the methods already in use are adequate for testing a large group of children. It is safe to assume, in terms of rehabilitation and conservation of hearing, that approximately 5 percent of school-age children have some impairment in one or both ears. In preventive terms, including seasonal temporary or subclinical impairment, the figure is probably closer to 10 percent.

The incidence of a handicapping amount of hearing impairment is more difficult to estimate. Figures range from 0.5 to 2 percent. This variation is due, in part, to the lack of standardization of test techniques, but largely to the difficulty of interpreting the tests and differentiating between impaired auditory function and developmental behavior in the child. A round number of 18,000 is given as the school-age children in the United States with sufficient impairment to warrant the term "deaf." Whether this figure is definitive depends largely on the concept of the word "deafness."

These statistics are largely based on tests of school children from 6 to 15 years of age. Large-scale audiometric measurements of the hearing acuity of children of preschool age have never been carried out. Nor has the significance of the findings in school-age children been applied to the younger age group.

## Types of Hearing Impairment

There are three classical types of hearing impairment—conductive, perceptive, and mixed.

Conductive impairment results from mechanical interference with the passage of sound waves through the external canal and ossicular chain to the inner ear or perceptive portion of the auditory apparatus. Either of two conditions usually underlies a conductive impairment: (1) Sound waves are prevented from reaching the middle ear by wax or some other obstruction in the external auditory canal, or (2) normal movement of the ossicles is impaired by changes around the ossicular joints or to changes in the middle ear mucosa that result from Eustachian or auditory tube blockage and infection. Conductive impairment simply diminishes the loudness of sound. It never causes total deafness. This can be demonstrated by bone conduction tests. Moreover, impaired hearing of the conductive type is often reversible in whole or in part, depending upon the nature of the lesion, an early diagnosis, and adequate treatment.

Perceptive impairment is due to atrophy or lack of development of the cochlear nerve or organ-of-corti cells in the inner ear or to a lesion

somewhere along the central auditory pathways. High tones are commonly more affected than low tones. When the hearing loss is severe, however, whatever the cause, both high tones and low tones are markedly impaired. Perceptive impairment may exist because of developmental factors as a result of focal infection, mumps, meningitis, etc., direct extension of a neighboring lesion (brain tumor), or to interference with the circulation of intra-labyrinthine fluids, especially endolymph. It is often an associated condition with certain types of cerebral palsy and must be suspected as a possible concomitant of various forms of cerebral degeneration. Perceptive impairment always involves distortion of sound and may result in total loss of hearing or "deafness" in the true sense of the word. There is, in general, no adequately demonstrated treatment for perceptive impairment.

A mixed impairment is a combination of the two fundamental types. The conductive portion may be reversible in whole or in part, even though the perceptive element is not amenable to treatment.

Finally, in purely functional terms, there is psychogenic hearing impairment which, by definition, presents no symptoms of otic pathology. It is seen most frequently in early adult life, but there is considerable evidence that a psychogenic hearing impairment is by no means rare in children.

## Psychoacoustic Considerations

The sounds of ordinary language are highly complex phenomena. The tonal range employed in ordinary speech-hearing is approximately that of a standard piano keyboard. In order that a person may perceive and understand the ordinary conversation that goes on around him, he must have a reasonably balanced auditory perception in the range between 250 (approximately middle C on the piano) and 4000 cycles per second. For the child with a moderately severe type of conductive impairment, the loudness of speech sounds is muffled while in the perceptive type, the clarity is distorted, and discrimination is impaired. Consequently, it is never enough to consider only whether a child hears or does not hear. The point is to determine as precisely as possible what he hears in a variety of acoustic circumstances, and how this hearing is related to his use of language and social maturity.

## Diagnostic Considerations

Audiometry is the term applied to the measurement with electronic instruments of auditory acuity for pure tones and speech. The pure-tone audiogram measures the patient's threshold of hearing for certain selected tones, usually across a band of six or seven octaves. It must be emphasized that this is a subjective test. For diagnostic

purposes, audiometry is an exacting procedure that requires considerable knowledge and patience on the part of the physician and concentration and cooperation on the part of the patient. Tuning fork tests aid in localizing the lesion, and speech-hearing tests give valuable information about the patient's ability to discriminate minimal differences in speech sounds and how well he uses what hearing he has.

In the hands of experienced testers, pure-tone audiometry is a useful diagnostic tool for children of school age. The responses of younger children, however, are very inaccurate. The diagnosis of hearing impairment in the child from 1 to 4 or 5 years of age has always been a baffling problem. If the problem were only to determine whether or not a child hears, there would be relatively little difficulty. Tuning forks, bells, clickers, whistles, snappers, and what not, have been used for this purpose, but with little regard for the pitch, the relative loudness, or for their meaning to the child under test. The child who turns his head at the drop of a bunch of keys and therefore presumably "hears" may perceive a high-pitched whistle only as a tiny squeak, or not perceive it at all. The point is that the use of keys, or a coin-click, or a bell offers only a gross test with specific reference to that particular sound. It is quite possible for a child to hear a bunch of keys dropped on a table behind him and yet not hear well enough to be able to imitate any sequence of sounds in ordinary language.

A variety of tests has been devised for young children, many of them dependent upon the use of conditioned response. They all have the disadvantage of dependence on overt or subjective responses on the child's part and are therefore potentially inaccurate for determining hearing thresholds. Recently an objective test, requiring no active cooperation on the part of the child, has been under investigation. The basic principle is that auditory stimuli evoke changes in skin resistance, which can be measured as shifts in voltage. During the past 2 years a technique has been developed by the authors[1] which makes possible an objective audiogram of infants and preschool-age children that is quite as accurate as the subjective, standard audiogram of older children and some adults. A pure tone from a standard audiometer is sounded in the child's ear, followed a few seconds later by a mild electric shock. Within a few minutes, the child becomes conditioned so that when he hears the tone a change in skin resistance occurs. This response is automatically recorded on a moving sheet of paper. Once this conditioning is established, the

[1] The original work was done in collaboration with Dr. Curt P. Richter in the Phipps Psychobiologic Laboratory. *See* Bordley, John E., Hardy, William G., and Richter, Curt P.: Audiometry with the use of galvanic skin-resistance response. Bull. Johns Hopkins Hosp. 82: 569 (1948); Bordley, John E. and Hardy, William G.: A study in objective audiometry with the use of a psychogalvanometric response. Ann. Otol., Rhin., and Laryng. 58: 751 (1949).

threshold of audition for the various frequencies can be determined and recorded in decibels on the standard audiogram chart. By this method, an audiogram can be made on children of any age beyond 9 to 10 months.

## Hearing and the Development of Language

The relations between hearing, speech, and language habits, in general, are so much a part of the child's growth and development that they are likely to be taken for granted. The child learns to talk because he hears and as he hears. In the normal course of events, his ability to communicate by sound and to imitate and reproduce the ordered array of sounds that we call language is a developing skill that usually makes its first great spurt at some period between the ages of 24 months and 36 months. By the age of 6 years, the child has learned most of the basic elements of his native language and is able to participate in ordinary communicative experiences.

For educational purposes it has been the practice to classify children in two categories: (1) profound hearing impairment, and (2) those with some lesser degree of impairment. According to this approach, the child whose impairment is congenital or acquired prior to the acquisition of basic language habits and is severe enough to preclude the development of speech is considered deaf. The child whose impairment is severe but not so profound as to preclude the learning of some language habits is considered hard-of-hearing. This differentiation is of dubious validity at the level of diagnosis and audiologic consultation. It is rare since the advent of antibiotics and the prevention of a destructive type of meningitis to find a totally deaf child. If he has any hearing whatever, it can generally be made useful through amplification and special training, with patience and understanding guidance at home, in the clinic, and at school, to facilitate the development of speech and language. The best that is available in pediatrics, maternal and child care, otology, audiology, psychiatry, psychology, and special education should be utilized in the recognition and treatment of these children as early in life as possible. Assuming, within reason, that approximately 5 percent of children have some significant hearing impairment, one must conclude that here is a public health problem of some magnitude.

## Clinical Audiology

Adequate handling of the child with impaired hearing involves multiple clinical services. Once the appraisal of the child-as-a-whole has been achieved and the necessary medical and/or surgical procedures completed, the audiologic problems are largely a matter of determining the child's needs in communicative skills in order for him

to learn how to compensate for the deficiencies caused by the hearing impairment.

The basic methods of the nonmedical procedures include: (1) parental instruction; (2) the use of amplification; (3) training in speech (lip) reading; (4) auditory training; (5) speech and language training. Any or all of these remedial steps may be indicated, depending upon the nature of the specific problem. An important consideration is the age of the child. Audiologic work should be started as early as possible, certainly by the age of 2 years. In this regard, a major category of audiology involves an extensive program of parental education.

Excellent special training is now being done with the 3- and 4-year-olds at all levels of hearing impairment from moderate to profound, but only in a few communities is it included in the public educational system. It has been clearly demonstrated that the 5-year-old with a handicapping hearing loss who has had 2 or 3 years of special training is a far different, better adjusted, more educable child than the one who has had nothing but sympathy or misunderstanding. These problems should be met in the preschool-age period.

For the school-age handicapped child, a reasonable line must be drawn between clinical audiology and education. It is not the audiologist's business to educate the child, but to try to see to it that the communicative disorder is correctly evaluated and the necessary remedial or compensatory measures are begun. This means not only conservation of psychosocial adjustment. What measures can and should be taken depend upon the individual child and upon the facilities available. In some rural sections an audiologic clinic in a public health center has proved eminently workable; in other districts a traveling clinic has proved to be the better answer.

## Preventive Audiology

Aside from the children in need of special communicative training and possibly a hearing aid, there is a large group who show some hearing loss following colds or who develop otitis media recurrently during the winter. These changes in the ears are usually associated with inflammation in and around the Eustachian tubes. If the acute condition is relieved with antibiotics, but the underlying cause of the ear symptoms (enlarged adenoids) is neither recognized nor corrected, many of these children will develop an irreversible hearing impairment of the conductive type. In the early stages, this type of hearing loss is often not recognized by the parents, who may say the child is inattentive, or by the teachers, who may think of him as inattentive, mischievous, or stupid.

These children live under a nervous strain and must always make a great effort to keep up with their fellows in the classroom and on the

playground. They far outnumber those with profound hearing loss and are equally deserving of attention since the chances are good for restoring the hearing or preventing behavioral difficulties and social maladjustments.

This type of hearing impairment is more likely to occur in the age group from 6 to 12 years than in the younger children. New techniques for the routine school-health screening tests now make it possible to pick up many of these children. These screening tests merely point out those with impaired hearing. What is needed now in the school system is a well-trained group to carry out the clinical services for these children. The methods of treatment such as irradiation and surgery are well known; the details of policy, administration, and finance must be worked out.

Many good clinics, or types of clinical services, have been established in various parts of the country. In such centers, children are examined by well-trained otologists and, when it is indicated, receive necessary treatment; referrals to the family's private otologist are made for surgery as indicated. In a very few places, as yet, special services in audiology and mental hygiene are available for consultative handling of problems involving communicative disorders and behavioral maladjustments; these services are carried out in close conjunction with those of the clinical otologist.

Thousands of children have already had the advantage of such referrals. Complete success in preventive terms will not be achieved, however, until systematic screening methods and thorough follow-up can be established for both school- and preschool-age groups, in metropolitan communities and in rural districts. It is reasonable to believe that the expenditures incurred would be readily met by savings in special education and cost of repeating grades.

## Conclusion

Up to the present time, the problems relating to impaired hearing have been largely centered in the school-age child, ostensibly because the impairment interferes with formal education. To the child, however, hearing impairment in the preschool years is even more important. It interferes with his acquisition of language and with his psychosocial development. Early diagnosis offers the only reasonable possibility of preventing untoward and undesirable changes in the preschool years.

The key to adequate preventive steps is the awareness on the part of the pediatrician that children with impaired hearing have a different behavioral pattern from children with normal hearing. In general, a differential diagnosis of deviant behavior is best preceded by auditory and visual tests and by psychometric tests adequately designed to offer qualitative results in both language- and nonlanguage-related performance, behavior, and learning capacity.

Accordingly, the ideal program would center in the pediatric clinic wherein the core of the clinical effort is complete evaluation of the child. In such a program, it becomes the pediatrician's responsibility to apprehend the possibility of hearing impairment and to confirm the diagnosis by referral. Once the diagnosis is established, the details of treatment, clinical follow-up, and whatever special consultation or training is indicated are carried out in a linear fashion so that the steps between diagnosis and recovery or rehabilitation follow through in regular sequence. In such terms, the necessary education of both the parents and their children with impairment follows in its proper order from cause to effect. Obviously, by the time he reaches school age, the child whose problems of hearing impairment have been so handled is in much better condition, physically and behaviorally, to face the changing pressures of school life. It is believed that, so organized, the problem of early diagnosis and treatment of preschool-age children with hearing impairment is the province of the medical field and is best handled at the public health level.

# Rehabilitation: The Role of the Health Department

By A. L. Chapman, M.D., and J. H. Gerber, M.D.*

"Rehabilitation" means different things to different people. To the nutritionist it means the restoration of health through supplementation of an inadequate diet; to the vocational teacher it means training the handicapped person for employment; and to the brace maker it means the fitting of a prosthetic appliance. To us, as it does to an increasing number of workers in the public health field, it means the physical, mental, social, and—whenever possible—vocational adjustment of an individual who has been disabled by illness or injury.

This broad comprehensive definition calls for the availability of a variety of services—definitive medical care, psychology, psychiatry, physical therapy, occupational therapy, speech therapy, social service, recreation, financial aid, counseling and guidance, vocational training, selective job placement, and follow-up. All of these must be adapted to the individual needs of the patient who may be deformed or paralyzed, blind or deaf, tuberculous or cardiac. For maximum results there must be the closest cooperation of all the voluntary and official community agencies with each other and with the medical profession.

Should rehabilitation be a concern of public health departments? We believe with Mustard (*1*) that a health program becomes one of public health interest when it can no longer be solved by the unassisted efforts of the citizen and the uncoordinated resources of the community. A rehabilitation program obviously requires community action and should, therefore, be a matter of concern to all public health workers.

Many official and voluntary agencies are at present engaged in programs of rehabilitation. The Veterans Administration has an extensive program for its beneficiaries. The Federal Office of Vocational Rehabilitation provides grants-in-aid to States for a broad program encompassing all types of services necessary to achieve the goal of returning handicapped civilians to full or part-time employment. Such programs are now operating in all States, the District of Columbia, Hawaii, and Puerto Rico. They are, however, hampered by insufficient appropriations. Numerous voluntary agencies have interested themselves in the rehabilitation of specific disability groups such as cerebral palsy, multiple sclerosis, and epilepsy.

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There is a distinct trend in the direction of comprehensive rehabilitation programs organized as rehabilitation centers and designed particularly to provide services to severely handicapped individuals. A number of such centers are now functioning under voluntary auspices. At least one is operated by a State Vocational Rehabilitation Agency.

The exact number of people who could immediately benefit from rehabilitation services is unknown. We do know, however, that the spectacular medical and public health successes of the recent past have made possible the survival of many people with disabilities of various degree. According to the most reliable data available (*2*), obtained through national and local surveys, there are approximately 2,000,000 adults with orthopedic impairments, 370,000 crippled children, 10,000,000 cardiovascular cases, 900,000 diabetics, 300,000 active tuberculosis patients, 230,000 blind, and 7,000,000 to 14,000,000 hard-of-hearing. And daily this backlog of patients is being swelled by untold numbers of new cases.

Many of these have residual capacities that can be developed or lost functions for which substitutions can be made through retraining or prosthetic appliances. Many can be taught to appreciate their remaining abilities and to live within them. Many can be brought to the level of self-help and even to self-support. There has been ample demonstration of this in the centers now functioning.

Restorative medicine is a difficult art under the best of conditions. When applied late the difficulties are multiplied many times; for to the original disease or injury have been added the destructive effects of neglect so appallingly evident in so many of the back-log cases—ankyloses, contractures, muscular atrophy, apathy, and discouragement. If maximum results are to be obtained, diagnosis must be made early; treatment must be instituted early, and rehabilitation must be started early—preferably at the time of diagnosis. Obviously, facilities and personnel must be readily available.

Many people play a part—sometimes directly and sometimes indirectly—in helping the disabled back toward normalcy. A friendly nurse visiting a bedridden arthritic person in the home actually is promoting restoration by her cheerfulness and optimism. A medical social worker whose knowledge of community resources permits her to bring increased cash benefits or needed medical service to a chronically ill welfare client is doing much to restore function. The private physician who prescribes limited exercise for his cardiac patient is an important member of the team.

But this is the provision of restorative services in a disorganized and unsystematized fashion. Each service is beneficial in itself, but more—much more—is required.

Community organization is necessary—a type of community organ-

ization that enlists and uses every service of every agency and every person who can contribute to the maximum development in the disabled of their residual capacities for more satisfying living.

Who should head up this organization? What agencies should promote its formation? The answers will vary for each community depending on the resources within it.

Is there an interested and active representative of the State Rehabilitation Division present? Let him head it up. Is the health officer keenly aware of a great deficit in rehabilitation services in his community, and is he anxious to do something about correcting it? Let him head it up. Perhaps a private physician or a club woman or social worker has a deep interest in this field. Let one of them assume the leadership.

At this moment the problem is not "*Who* should take the lead?" but "Will *someone* take the lead?" This is the time to accept the leadership of any qualified leader so that services may be provided. Later on, after an organization has been developed, there will be time to modify, expand, and improve.

There are seven major phases, as we see it, in the provision of a total rehabilitation program in a community. The health department has a role to play in each of them. Where the service is being provided by another agency, official or voluntary, the health officer can cooperate to improve and expand it. If a service is not available, the health officer can join with other agencies in arranging for its provision.

It cannot be stressed too strongly that all phases of the rehabilitation program must be linked into a continuous plan. Coordinative service can best be performed, under medical supervision, by a case worker. The case worker may be employed by the State Rehabilitation Division (whose vocational counselors have had notable experience in this field), the rehabilitation center, the health department, or some other responsible official or voluntary agency.

The first phase in the restoration of function is case finding. This is no new activity for the public health worker. Instead of limiting the search to those suffering from scarlet fever and diphtheria, poliomyelitis and rheumatic fever, attention is directed as well to arthritics and cardiacs, the blind and the deaf, the paralyzed and the deformed.

Here again, as in most new public health programs, an added burden will be placed on the shoulders of the busy public health nurse. Fortunately, the acute communicable diseases are rapidly coming under control, and progress in this area will permit her to devote more of her time to this newer field.

The zeal with which the public health nurse seeks out the chronically ill and disabled will depend in large measure upon the enthusiasm of the health officer for the program and the existence of facilities for aiding these patients once they are found.

The second phase of this program is the provision of diagnostic facilities to determine the nature and extent of lost physical and mental functions and an evaluation of potential residual abilities. It is not sufficient for the physician to make a diagnosis based on pathology alone. This diagnosis must be translated into terms of impaired function. The ability of the patient to adapt himself to his limitations, his emotional reactions to his disability, his past employment, and his hopes for the future must be determined.

In few communities do all the required rehabilitation diagnostic services exist at the present time. The local health officer could spearhead a community effort to establish them, or he could serve as a member of an organizing group.

In connection with the establishment of diagnostic facilities, one of the greatest difficulties at the present time is the procurement of the services of a physician trained in rehabilitation. Unless a physician has had at least basic training in this field, it is difficult for him to develop a rehabilitation point of view. Without such a point of view, he will continue to make pathologic diagnoses based on the traditional concepts of medicine and surgery.

If no local physician has had training in rehabilitation, an important responsibility of the health officer would be to encourage and to assist one or more physicians to obtain such training. Fortunately, several medical schools and hospitals in the country are now providing courses in this field.

The third phase of the program is the writing of the rehabilitation prescription—the plan of the services to be provided. It should include the regimen of physiotherapy, occupational therapy, psychotherapy, diet, rest, and exercise required for the restoration of specific functions that have been lost, or the development of others to replace them. Consideration must be given to the social and vocational needs of the individual as well as to his physical and mental needs. This plan of action can only be written by a team of experts in the indicated fields under the supervision of a clinician trained in rehabilitation. The health officer and his staff should be prepared to provide such expert assistance as the situation may demand.

The fourth phase involves the filling of the prescription. It is filled by physicians, therapists, social workers, nurses, nutritionists, counselors, and vocational teachers. They provide their services in rehabilitation divisions of hospitals, in affiliated rehabilitation centers, in home care programs, in custodial institutions, or in private homes. Their services are given under the supervision of rehabilitation specialists in consultation with family physicians. These personnel may be employed full- or part-time by the local health department, by the hospital, or by some other community agency. With this in

mind, the alert health officer will begin to train key personnel in the fundamentals of rehabilitation techniques. He will begin to place new job descriptions in his budget. And he will begin to define the necessary relationships with community hospitals and other voluntary and official agencies.

The fifth phase—vocational training—involves the sharpening of existing occupational skills or the development of new ones. The abilities, capacities, and previous experiences of the patient must be carefully evaluated in order that training may be directed in the proper channels. This training can be started advantageously in the hospital and continued in the home, the convalescent institution, the sheltered work shop, or on the job itself, depending on the degree to which work tolerance has been developed. Such a program demands the availability of many community resources which at present are too frequently inadequate. Here the health officer can be of inestimable value in assisting in the improvement and expansion of facilities and in the creation of new ones.

The sixth phase—job placement—is the ultimate aim of the vocational rehabilitation program. There can be no great success in this area until employers, personnel managers, industrial physicians, and labor unions are ready and willing to provide jobs to the handicapped. Here again the health officer is in a strategic position to offer considerable help in spreading the information that rehabilitated people make safe, steady, and productive workers. Sufficient convincing evidence on this score is available (*3*).

The seventh phase is case follow-up. This involves the maintenance of a health record for every rehabilitation patient, the provision of continuous medical supervision, and—most important—continuous encouragement in order to help him remain at his peak level of improvement. The patient himself has to work hard at it, but he needs all the support he can get. The health officer and his staff can be of great assistance in this phase of the program.

An important function of the health officer is to make known to the public, to physicians, to appropriating bodies, to employers, and to all public health workers the true value of rehabilitation to the community as well as to the individuals directly affected. Aside from the humanitarian results, the benefits to the community in decreased dependency of the disabled must be stressed. For example, without rehabilitation a disabled person frequently becomes a public liability at an annual cost of between $350 to $600, whereas each successful rehabilitation case costs approximately $460—a one-time expenditure. It is important for the community to know that, from our present experience, for every dollar spent by the Federal Government on his rehabilitation, the average disabled person will pay $10 in Federal income taxes (*4*).

The benefits of rehabilitation were established during World War I, but except for a few notable instances interest in this field soon lagged. Under the stimulation of World War II, old techniques were refined and new ones were developed. Rehabilitation programs for military personnel were tremendously expanded. Following the war, these services became available on a modest scale to civilians, but there remains a widespread lack of adequate facilities and of professional personnel trained in the special techniques required. Health departments on all levels have a definite role to play in seeing that these services are made available to every individual, disabled by illness or injury, who may be able to benefit from them.

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(*3*) Harvey, Verne K. and Luongo, E. Parker: Physical impairment and job performance, J. A. M. A. 127: 901–907; 961–970 (1945).

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# Personnel Needs in the Environmental Health and Sanitation Field

By Arthur P. Miller*

Repeated inquiries about job availability from men who will soon graduate from colleges and universities after completing the sanitary engineering curricula, and from professors of sanitary engineering prompted the collection of current facts on present vacancies in the organizations of official agencies engaged in public health work.

Although information about current vacancies was of first importance in this investigation, some facts about future needs for both sanitary engineers and other professional categories utilized in environmental health work were sought at the same time. This inquiry was initiated before the defense effort had gained its present momentum; hence, it is emphasized that these estimates are based on normal, "peacetime" conditions.

The data were collected with the assistance of the Public Health Service regional engineers and their counterparts in the State health departments during the period October 23, 1950 to February 1, 1951. No information was received from two States and only partial figures were obtained for two others.

The results of the inquiry are summarized below:

*Personnel needs for environmental health and sanitation activities*

| | State level | | City, county, other levels | | Totals | |
|---|---|---|---|---|---|---|
| | Professional engineers | All other professional categories | Professional engineers | All other professional categories | Professional engineers | All other professional categories |
| Number of existing vacancies for which funds are available | 74 | 57 | 33 | 95 | 107 | 152 |
| In terms of current programs, number of additional persons who could be used if funds were available | 250 | 167 | 232 | 714 | 482 | 881 |
| In terms of anticipated requirements 5 years from the inquiry date, total number (present and future) of personnel required | 1,047 | 732 | 527 | 3,850 | 1,574 | 4,582 |
| Totals | 1,371 | 956 | 792 | 4,659 | 2,163 | 5,615 |

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# Incidence of Disease

*No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring*

## UNITED STATES

### Reports From States for Week Ending April 7, 1951

*Influenza*

In collaboration with the Influenza Information Center, National Institutes of Health, the following report on influenza has been prepared.

The total number of influenza cases reported for the current week was 7,253, a decline from the 8,982 reported last week. For the corresponding week last year, 9,487 cases were reported.

Dr. James C. Hart, Director, Connecticut Department of Health, stated that the following cases of influenza were reported: January, 8; February, 696; and March (1st to 25th, inclusive), 2,294. Paired blood samples from 69 patients have been received by the State health department laboratory for hemagglutination inhibition tests for influenza. Out of these, 26 were negative, 27 showed a rising titer for A-prime, 12 showed a rising titer for A and A-prime, and 5 had a high titer for A-prime in both acute and convalescent blood samples (probably due to late taking of the acute specimen). The confirmed cases are reported from eight different townships of the State and appear to be a representative group of those cases reported during the present epidemic.

Dr. M. Michael Sigel of the collaborating laboratory at the Children's Hospital of Philadelphia reports a total of 115 paired sera which showed a rise in titer against influenza A as demonstrated in the complement fixation test for the period from January 1 to March 22, 1951. Of these, 83 cases were clinically diagnosed as influenza, 31 as pneumonia, and 1 as gastroenteritis. There was no serologic evidence of infection with either influenza B or strain 1233 in sera tested during this period. Influenza cases reported to the Philadelphia Department of Health have decreased considerably in the last few weeks.

Dr. Albert Milzer of the collaborating laboratory at the Michael Reese Hospital, Chicago, reports a significant rise (at least fourfold) in complement-fixing antibody titer in paired sera against the Lee strain of influenza B virus in six patients, the FM–1 strain of influenza A-prime in one patient, and the Thompson strain of influenza A-prime in two patients.

Dr. E. H. Lennette, Director of the Regional Laboratory in Berkeley, Calif., reports a rise in complement-fixing antibody titer in 58 paired sera against influenza A, and a rise in 1 paired sera against influenza B tested during the week of March 24 to 30.

The Preventive Medicine Division of the Surgeon General's office of the Army, reports two paired sera showing a rise in titer for both A and A-prime. One case was from a military installation in Virginia and one in Ohio. Influenza A-prime virus has been isolated recently from two cases—one from a military installation in Maryland and one in Kentucky.

Dr. D. S. Flurry reports that 11 paired sera specimens showed a significant increase in antibody titer with the PR-8 strain; 10 of the 11 showed an increase with the FM-1 strain of influenza virus in the hemagglutination inhibition test. None of these showed a significant rise with influenza B virus.

Dr. Irving Gordon, Director of the Regional Laboratory, New York State Department of Health, has studied antigenically four more recently isolated influenza virus strains. Like those previously isolated this year, they resemble the 1950 A-prime strain much more closely than the FM-1 strain.

*Measles*

Reported cases of measles increased from 19,548 last week to 20,707 for the current week. For the corresponding week last year, 10,209 cases of measles were reported.

## Epidemiological Reports

*Food Poisoning*

Dr. James R. Enright, Chief, Bureau of Epidemiology, Territory of Hawaii Department of Health, reports that 135 cases of staphylococcal food poisoning occurred following a lunch in a Honolulu high school. All but 2 of the patients were children, and 59 were hospitalized. The first case of illness occurred Friday, March 30, about 2 p. m. Practically all the affected students recovered and attended school the following Monday. Of the 1,200 meals served that day, 1,000 included baked, smoked picnic ham shoulder which was the only food common to all those becoming ill. The illness developed about 2½ hours after eating when the children were striken suddenly with nausea, vomiting, and prostration. Laboratory examination of ham samples resulted in cultures of a gram positive, hemolytic, mannite, fermenting coagulase positive *Micrococcus* (*Staphylococcus*) *pyogenes* var. *aureus*. The colony count was about 10 million per gram. The same organism was isolated from two samples of vomitus. The conclusion as to the cause of the illnesses was that the infection of the food occurred during processing at the cafeteria, perhaps following

the boiling and baking. The ham was de-boned and processed by two experienced cafeteria workers who had no symptoms of colds or sore throat and who had no infected cuts on their hands or arms. The cause of illness is presumed to be staphylococcal enterotoxin.

Dr. W. L. Halverson, California Director of Public Health, reports two outbreaks of food poisoning in which 15 and 25 persons in each group were affected. Creamed ham and eggs served in one restaurant was eaten by 15 persons who become ill 5 to 12 hours after eating. In the second outbreak, corned beef, served by popular resort establishment was regarded as responsible for 25 cases. Laboratory reports have not been completed.

### *Typhoid Fever*

Dr. H. M. Erickson, Oregon State Health Officer, reports finding the source of three cases of typhoid fever out of a total of six this year. One child was infected by his grandmother, probably through food, while visiting her home. Two cases were traced to raw milk in a one-cow dairy where both the proprietor and his wife were found to be typhoid fever carriers.

***Comparative Data For Cases of Specified Reportable Diseases: United States***

[Numbers after diseases are International List numbers, 1948 revision]

| Disease | Total for week ended— | | 5-year median 1946–50 | Seasonal low week | Cumulative total since seasonal low week | | 5-year median 1945–46 through 1949–50 | Cumulative total for calendar year— | | 5-year median 1946–50 |
|---|---|---|---|---|---|---|---|---|---|---|
| | Apr. 7, 1951 | Apr. 8, 1950 | | | 1950–51 | 1949–50 | | 1951 | 1950 | |
| Anthrax (062) | 2 | 1 | 1 | (1) | (1) | (1) | (1) | 22 | 8 | 14 |
| Diphtheria (055) | 67 | 116 | 135 | 27th | 4,182 | 6,397 | 9,218 | 1,275 | 2,126 | 2,860 |
| Encephalitis, acute infectious (082) | 15 | 8 | 7 | (1) | (1) | (1) | (1) | 202 | 175 | 112 |
| Influenza (480–483) | 7,253 | 9,487 | 1,598 | 30th | 111,993 | 125,845 | 125,845 | 97,451 | 115,261 | 115,261 |
| Measles (085) | 20,707 | 10,209 | 25,842 | 35th | 225,901 | 126,444 | 259,994 | 197,200 | 107,314 | 225,048 |
| Meningitis, meningococcal (057.0) | 94 | 109 | 87 | 37th | [2] 2,459 | 2,252 | 2,172 | [3] 1,498 | 1,338 | 1,200 |
| Pneumonia (490–493) | 2,417 | 2,492 | | (1) | (1) | (1) | (1) | 28,618 | 36,290 | |
| Poliomyelitis, acute (080) | 58 | 63 | 37 | 11th | 145 | 187 | 88 | 1,357 | 1,318 | 689 |
| Rocky Mountain spotted fever (104) | | 3 | | (1) | (1) | (1) | (1) | 4 | 15 | 12 |
| Scarlet fever (050) [3] | 2,132 | 1,557 | 2,354 | 32d | 47,763 | 41,321 | 61,981 | 32,072 | 24,882 | 38,223 |
| Smallpox (084) | | 1 | 3 | 35th | 13 | 39 | 57 | 5 | 18 | 36 |
| Tularemia (059) | 9 | 13 | 18 | (1) | (1) | (1) | (1) | 197 | 300 | 300 |
| Typhoid and paratyphoid fever (040, 041) [4] | 29 | 40 | 40 | 11th | 117 | 132 | 133 | 552 | 612 | 631 |
| Whooping cough (056) | 1,302 | 2,373 | 2,019 | 39th | 43,379 | 57,754 | 57,754 | 21,777 | 36,218 | 30,757 |

[1] Not computed. [2] Addition—Maine, week ended February 10, 1 case. Deduction—North Carolina, week ended March 17, 1 case. [3] Including cases reported as streptococcal sore throat. [4] Including cases reported as salmonellosis.

Note.—Cumulative figures changed by delayed reports from California and Idaho.

## Reported Cases of Selected Communicable Diseases: United States, Week Ended April 7, 1951

[Numbers under diseases are International List numbers, 1948 revision]

| Area | Diphtheria (055) | Encephalitis, infectious (082) | Influenza (480–483) | Measles (085) | Meningitis, meningococcal (057.0) | Pneumonia (490–493) | Poliomyelitis (080) |
|---|---|---|---|---|---|---|---|
| **United States** | 67 | 15 | 7,253 | 20,707 | 94 | 2,417 | 58 |
| **New England** | 3 | | 343 | 759 | 3 | 74 | |
| Maine | | | 242 | 2 | | 19 | |
| New Hampshire | | | 34 | 36 | | 7 | |
| Vermont | | | 15 | 104 | 1 | | |
| Massachusetts | 3 | | | 563 | | | |
| Rhode Island | | | 1 | | | 4 | |
| Connecticut | | | 51 | 54 | 2 | 44 | |
| **Middle Atlantic** | 3 | 2 | 214 | 2,308 | 18 | 203 | 6 |
| New York | 3 | 1 | [1] 100 | 721 | 5 | 37 | 5 |
| New Jersey | | 1 | 114 | 546 | 2 | 82 | 1 |
| Pennsylvania | | | | 1,241 | 11 | 84 | |
| **East North Central** | 5 | 4 | 145 | 3,373 | 13 | 284 | 4 |
| Ohio | | | | 905 | 3 | | 1 |
| Indiana | 3 | | 4 | 114 | | 12 | |
| Illinois | | 1 | 22 | 559 | 6 | 122 | 1 |
| Michigan | 2 | 3 | 119 | 600 | 3 | 150 | 2 |
| Wisconsin | | | | 1,105 | 1 | | |
| **West North Central** | 7 | | 30 | 1,047 | 3 | 214 | 12 |
| Minnesota | 4 | | 2 | 113 | 1 | 11 | |
| Iowa | | | | 34 | 1 | | 2 |
| Missouri | 1 | | 6 | 200 | | 2 | |
| North Dakota | 1 | | 21 | 69 | 1 | 176 | |
| South Dakota | | | 1 | 29 | | | 9 |
| Nebraska | 1 | | | 17 | | | 1 |
| Kansas | | | | 585 | | 25 | |
| **South Atlantic** | 14 | 4 | 3,784 | 1,648 | 21 | 542 | 13 |
| Delaware | | | 11 | 20 | 1 | | |
| Maryland | 2 | | 14 | 180 | 1 | 54 | |
| District of Columbia | | | 1 | 43 | | 20 | |
| Virginia | | | 512 | 694 | 3 | 86 | |
| West Virginia | 3 | | 2,449 | 132 | 6 | 47 | 2 |
| North Carolina | 2 | 3 | | 104 | 2 | | |
| South Carolina | | | 124 | 18 | 2 | 15 | |
| Georgia | 5 | 1 | 673 | 399 | 1 | 320 | 6 |
| Florida | 2 | | | 58 | 5 | | 5 |
| **East South Central** | 10 | 2 | 121 | 729 | 9 | 167 | 6 |
| Kentucky | 2 | | 7 | 487 | 1 | 10 | |
| Tennessee | 4 | 2 | 94 | 98 | 4 | | 1 |
| Alabama | 2 | | | 86 | 1 | 123 | 4 |
| Mississippi | 2 | | 20 | 58 | 3 | 34 | 1 |
| **West South Central** | 23 | 3 | 1,107 | 4,635 | 17 | 686 | 10 |
| Arkansas | 2 | | 847 | 324 | | 88 | |
| Louisiana | 1 | | 21 | 74 | 3 | 38 | 2 |
| Oklahoma | 4 | | 239 | 358 | 1 | 51 | 2 |
| Texas | 16 | 3 | | 3,879 | 13 | 509 | 6 |
| **Mountain** | | | 911 | 1,641 | 1 | 135 | |
| Montana | | | 24 | 43 | 1 | | |
| Idaho | | | | 29 | | | |
| Wyoming | | | | 74 | | 1 | |
| Colorado | | | 16 | 709 | | 61 | |
| New Mexico | | | 16 | 83 | | 19 | |
| Arizona | | | 855 | 637 | | 54 | |
| Utah | | | | 45 | | | |
| Nevada | | | | 21 | | | |
| **Pacific** | 2 | | 598 | 4,367 | 9 | 112 | 7 |
| Washington | | | 144 | 821 | 4 | 5 | |
| Oregon | | | 314 | 442 | 3 | 37 | |
| California | 2 | | 140 | 3,104 | 2 | 70 | 7 |
| Alaska | | | 12 | | | | |
| Hawaii | | | 5 | 8 | | | |

[1] New York City only.
Anthrax: Massachusetts and New Jersey, 1 case each.

## Reported Cases of Selected Communicable Diseases: United States, Week Ended April 7, 1951—Continued

[Numbers under diseases are International List numbers, 1948 revision]

| Area | Rocky Mountain spotted fever (104) | Scarlet fever (050) | Smallpox (084) | Tularemia (059) | Typhoid and paratyphoid fever [1] (040,041) | Whooping cough (056) | Rabies in animals |
|---|---|---|---|---|---|---|---|
| **United States** | | 2,132 | | 9 | 29 | 1,302 | 139 |
| **New England** | | 190 | | | 2 | 97 | |
| Maine | | 9 | | | 1 | 20 | |
| New Hampshire | | [2] 9 | | | | 3 | |
| Vermont | | 3 | | | | 8 | |
| Massachusetts | | 137 | | | 1 | 52 | |
| Rhode Island | | 6 | | | | 9 | |
| Connecticut | | 26 | | | | 5 | |
| **Middle Atlantic** | | 340 | | | 6 | 170 | 12 |
| New York | | [2] 156 | | | 5 | 40 | 12 |
| New Jersey | | 44 | | | | 51 | |
| Pennsylvania | | 140 | | | 1 | 79 | |
| **East North Central** | | 657 | | | 1 | 171 | 13 |
| Ohio | | 189 | | | | 38 | 1 |
| Indiana | | 47 | | | | 7 | 10 |
| Illinois | | 117 | | | 1 | 38 | 1 |
| Michigan | | 243 | | | | 40 | 1 |
| Wisconsin | | 61 | | | | 48 | |
| **West North Central** | | 162 | | | 2 | 83 | 27 |
| Minnesota | | 43 | | | | 4 | 1 |
| Iowa | | 10 | | | | 3 | 17 |
| Missouri | | 43 | | | 1 | 4 | 9 |
| North Dakota | | | | | | 2 | |
| South Dakota | | 5 | | | | 3 | |
| Nebraska | | 16 | | | | 5 | |
| Kansas | | 45 | | | 1 | 62 | |
| **South Atlantic** | | 211 | | 3 | 3 | 204 | 20 |
| Delaware | | 2 | | | | 5 | |
| Maryland | | 34 | | | | 11 | |
| District of Columbia | | 17 | | | | 3 | |
| Virginia | | 36 | | | | 24 | |
| West Virginia | | 44 | | | 1 | 52 | 4 |
| North Carolina | | 48 | | | | 47 | |
| South Carolina | | 3 | | 2 | | 6 | 10 |
| Georgia | | 17 | | 1 | 2 | 43 | 6 |
| Florida | | [2] 10 | | | | 13 | |
| **East South Central** | | 60 | | | 2 | 29 | 26 |
| Kentucky | | 21 | | | 2 | 1 | 7 |
| Tennessee | | 31 | | | | 11 | 10 |
| Alabama | | 5 | | | | 12 | 8 |
| Mississippi | | 3 | | | | 5 | 1 |
| **West South Central** | | 87 | | 3 | 3 | 385 | 40 |
| Arkansas | | 3 | | 2 | | 17 | 7 |
| Louisiana | | 12 | | | | 1 | |
| Oklahoma | | 20 | | 1 | | 24 | 3 |
| Texas | | 52 | | | 3 | 343 | 30 |
| **Mountain** | | 109 | | 3 | 2 | 116 | |
| Montana | | 8 | | | | 16 | |
| Idaho | | 19 | | | | 2 | |
| Wyoming | | 1 | | 3 | 1 | 2 | |
| Colorado | | 20 | | | 1 | 13 | |
| New Mexico | | 4 | | | | 22 | |
| Arizona | | 4 | | | | 59 | |
| Utah | | [2] 53 | | | | 2 | |
| Nevada | | | | | | | |
| **Pacific** | | 316 | | | 8 | 47 | 1 |
| Washington | | 91 | | | | 11 | 1 |
| Oregon | | 43 | | | | 3 | |
| California | | [2] 182 | | | 8 | 33 | |
| Alaska | | | | | | | |
| Hawaii | | 2 | | | 1 | | |

[1] Including cases reported as salmonellosis.
[2] Including cases reported as streptococcal sore throat

# FOREIGN REPORTS

## CANADA

*Reported Cases of Certain Diseases—Week Ended Mar. 24, 1951*

| Disease | Total | Newfoundland | Prince Edward Island | Nova Scotia | New Brunswick | Quebec | Ontario | Manitoba | Saskatchewan | Alberta | British Columbia |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Brucellosis | 3 | | | | | 3 | | | | | |
| Chickenpox | 629 | | | 4 | | 110 | 323 | 11 | 21 | 56 | 104 |
| Diphtheria | 3 | 1 | | | | 2 | | | | | |
| Dysentery, bacillary | 8 | | | | | 3 | | 3 | | | 2 |
| Encephalitis, infectious | 2 | | | | | | | | 1 | 1 | |
| German measles | 286 | | | 46 | | 12 | 164 | | 11 | 21 | 32 |
| Influenza | 1,831 | 15 | | 77 | 14 | | 9 | 69 | 4 | | 1,643 |
| Measles | 950 | 5 | | 36 | | 79 | 668 | 52 | 6 | 40 | 64 |
| Meningitis, meningococcal | 6 | | | | 2 | | 2 | 2 | | | |
| Mumps | 787 | | | 4 | 1 | 220 | 260 | 17 | 76 | 98 | 111 |
| Scarlet fever | 221 | | | 2 | | 54 | 45 | 19 | 10 | 36 | 55 |
| Tuberculosis (all forms) | 158 | 3 | | 4 | 10 | 74 | 19 | 9 | 11 | 1 | 27 |
| Typhoid and paratyphoid fever | 9 | | | | | 5 | 1 | | | | 3 |
| Venereal diseases: | | | | | | | | | | | |
| Gonorrhea | 189 | | | 4 | 8 | 29 | 32 | 22 | 10 | 35 | 49 |
| Syphilis | 93 | 5 | | 4 | 5 | 39 | 20 | 1 | 6 | | 13 |
| Primary | 6 | 1 | | 1 | | 1 | 2 | | | | 1 |
| Secondary | 7 | 2 | | | | 1 | 3 | | | | 1 |
| Other | 80 | 2 | | 3 | 5 | 37 | 15 | 1 | 6 | | 11 |
| Whooping cough | 81 | | | 3 | 1 | 17 | 39 | | | 10 | 11 |

## CUBA

*Reported Cases of Certain Diseases—4 Weeks Ended Jan. 27, 1951*

| Disease | Pinar del Rio | Habana | | Matanzas | Santa Clara | Camaguey | Oriente | Total |
|---|---|---|---|---|---|---|---|---|
| | | Habana City | Total | | | | | |
| Cancer | 4 | | 26 | 12 | 24 | 2 | 12 | 80 |
| Chickenpox | | 17 | 17 | 3 | | | 5 | 25 |
| Diphtheria | 2 | 5 | 6 | 4 | 2 | | 2 | 16 |
| Hookworm disease | | | 12 | | | | | 12 |
| Leprosy | | | 3 | | 1 | | 1 | 5 |
| Malaria | | | 1 | | | 1 | 90 | 92 |
| Measles | | 11 | 12 | | 19 | | 68 | 99 |
| Poliomyelitis | | | 1 | | 1 | 1 | | 3 |
| Tetanus | | | | | | 1 | | 1 |
| Tuberculosis | 4 | | 13 | 14 | 7 | 10 | 6 | 54 |
| Typhoid fever | 3 | 3 | 6 | 2 | 1 | 1 | 5 | 18 |
| Whooping cough | | | 1 | | 6 | 1 | 26 | 34 |

## FINLAND

*Reported Cases of Certain Diseases—January 1951*

| Disease | Cases | Disease | Cases |
|---|---|---|---|
| Diphtheria | 93 | Typhoid fever | 7 |
| Meningitis, meningococcal | 3 | Venereal diseases: | |
| Paratyphoid fever | 30 | Gonorrhea | 353 |
| Poliomyelitis | 16 | Syphilis | 31 |
| Scarlet fever | 2,599 | | |

## JAMAICA

*Reported Cases of Certain Diseases—4 Weeks Ended Feb. 24, 1951*

| Disease | Kingston | Other localities | Total |
|---|---|---|---|
| Chickenpox | 6 | 26 | 32 |
| Diphtheria | 3 | 5 | 8 |
| Dysentery, unspecified | 5 | | 5 |
| Leprosy | 1 | 1 | 2 |
| Meningitis, meningococcal | | 1 | 1 |
| Ophthalmia neonatorum | 1 | | 1 |
| Poliomyelitis | 1 | | 1 |
| Puerperal sepsis | | 1 | 1 |
| Scarlet fever | | 1 | 1 |
| Tuberculosis, pulmonary | 19 | 53 | 72 |
| Typhoid fever | 11 | 57 | 68 |

## MADAGASCAR

*Reported Cases of Certain Diseases and Deaths—December 1950*

| Disease | Aliens | | Natives | |
|---|---|---|---|---|
| | Cases | Deaths | Cases | Deaths |
| Beriberi | | | 2 | |
| Bilharziasis | | | 20 | |
| Diphtheria | 2 | 1 | 7 | 3 |
| Dysentery: | | | | |
| Amebic | 4 | | 117 | |
| Bacillary | 1 | | 18 | |
| Erysipelas | | | 7 | |
| Influenza | 14 | | 2,440 | 13 |
| Leprosy | | | 35 | |
| Malaria | 233 | 2 | 32,399 | 141 |
| Measles | 9 | | 157 | |
| Meningitis, meningococcal | | | 1 | |
| Mumps | | | 84 | |
| Plague | | | 49 | 38 |
| Pneumonia (all forms) | 1 | | 739 | 46 |
| Puerperal infection | | | 9 | |
| Scarlet fever | | | 1 | |
| Trachoma | 2 | | 2 | 1 |
| Tuberculosis, respiratory | 5 | 2 | 90 | 15 |
| Typhoid fever | 8 | | 6 | 1 |
| Whooping cough | 3 | | 268 | 3 |

# WORLD DISTRIBUTION OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER

The following tables are not complete or final for the list of countries included or for the figures given. Since many of the figures are from weekly reports, the accumulated totals are for approximate dates.

## CHOLERA

[Cases]

| Place | January–February 1951 | March 1951—week ended— | | | | |
|---|---|---|---|---|---|---|
| | | 3 | 10 | 17 | 24 | 31 |
| ASIA | | | | | | |
| Burma | 456 | [1] 8 | [1] 6 | [1, 2] 27 | [1] 14 | [1] 43 |
| Akyab | 7 | | | | | |
| Bassein | 78 | 4 | | [3] 2 | | 5 |
| Moulmein | 1 | 4 | 6 | 24 | 14 | 38 |
| Rangoon | 10 | | | 1 | | |
| India | 20,670 | [1] 114 | [1] 137 | [1] 190 | [1] 126 | [1] 158 |
| Bombay | 1 | | | | | |
| Calcutta | 565 | 86 | 107 | 168 | 117 | 150 |
| Cuddalore | 3 | | | | | 4 |
| Madras | 88 | 10 | 7 | 7 | 3 | 3 |
| Nagpur | 58 | | | 9 | | |
| Negapatam | 68 | 4 | 9 | 3 | 3 | |
| Tiruchirappali | 71 | 14 | 9 | 2 | 3 | 1 |
| Tuticorin | 23 | | 5 | 1 | | |
| India (French): | | | | | | |
| Karikal | 33 | | 3 | 1 | | |
| Pondicherry | 67 | 15 | 16 | 11 | | |
| Indochina: | | | | | | |
| Cambodia | 30 | | | 1 | 4 | |
| Viet Nam | 5 | | 2 | 1 | | |
| Haiphong | 3 | | | | | |
| Soc Trang | 1 | | 1 | | | |
| Pakistan | 3,033 | 201 | [1] 1 | [1] 4 | [1] 4 | [1] 3 |
| Chittagong | [3] 1 | | 1 | 2 | 4 | 3 |
| Dacca | 18 | 2 | | 2 | | |

[1] Preliminary. [2] Including imported cases. [3] Imported.

## PLAGUE

[Cases]

| Place | January–February 1951 | March 3 | March 10 | March 17 | March 24 | March 31 |
|---|---|---|---|---|---|---|
| AFRICA | | | | | | |
| Belgian Congo | 2 | 1 | 1 | | 3 | |
| Stanleyville Province | 2 | 1 | 1 | | 3 | |
| British East Africa: | | | | | | |
| Tanganyika | | | | | [1] 19 | |
| Madagascar | 86 | | [2] 4 | | | |
| Union of South Africa | 1 | | | | | |
| Orange Free State | 1 | | | | | |
| ASIA | | | | | | |
| Burma | 150 | 46 | 10 | 8 | | |
| Tavoy | | | 1 | 1 | | |
| India | 2,546 | [3] 7 | [3] 14 | [3] 6 | [3] 9 | [3] 14 |
| Allahabad | [4] 4 | [4] 5 | [4] 4 | [4] 2 | [4] 7 | [4] 14 |
| Bombay | | | | [4] 1 | | |
| Cawnpore | | 2 | | | | |
| Lucknow | [4] 3 | | [4] 3 | 1 | 2 | |
| Nagpur | | | 7 | 2 | | |
| Indochina: | | | | | | |
| Cambodia | | | 1 | 2 | 3 | |
| Pnom Penh | | | 1 | 2 | 3 | |
| Viet Nam | 14 | | | | | 2 |
| Phanthiet | 9 | | | | | 2 |
| Indonesia: | | | | | | |
| Java | [5] 4 | | | | | |
| Djakarta | [4] 1 | | | | | |
| Jogjakarta | 2 | | | | | |
| Semarang | [4] 1 | | | | | |
| Thailand | 7 | | | | | |

[1] Includes suspected cases. [2] Mar. 1–10, 1951. [3] Preliminary figure. [4] Imported. [5] Includes imported cases.

## SMALLPOX

[Cases]

| Place | January–February 1951 | March 1951—week ended— 3 | 10 | 17 | 24 | 31 |
|---|---|---|---|---|---|---|
| **AFRICA** | | | | | | |
| Algeria | 16 | | | | | |
| Belgian Congo | 306 | 39 | 39 | | | |
| British East Africa: | | | | | | |
| Kenya | 1 | | | | | |
| Nyasaland | 13 | | | | | |
| Tanganyika | 59 | | | | | |
| Cameroon (British) | 4 | | | | | |
| Cameroon (French) | 50 | | [1] 5 | | | |
| Egypt | | 1 | | | | |
| Ethiopia | 5 | | | | | |
| French Equatorial Africa | 28 | | [1] 2 | | | |
| French West Africa | 719 | | [1] 88 | [2] 118 | | |
| Dahomey | 229 | | [1] 35 | [2] 13 | | |
| Guinea | 7 | | | | | |
| Ivory Coast | 49 | | [1] 6 | [2] 3 | | |
| Niger Territory | 138 | | [1] 9 | [2] 18 | | |
| Sudan | 214 | | [1] 16 | [2] 50 | | |
| Upper Volta | 82 | | [1] 22 | [2] 34 | | |
| Gold Coast | 265 | | 12 | 18 | | |
| Morocco (French) | 5 | | | | | |
| Mozambique | 26 | | | | | |
| Nigeria | 1,852 | | | | | |
| Rhodesia: | | | | | | |
| Southern | 89 | | | | | |
| Sudan (Anglo-Egyptian) | 12 | 1 | | 1 | 1 | |
| Togo (French) | 21 | | [1] 1 | | | |
| **ASIA** | | | | | | |
| Afghanistan | 97 | 4 | | | | |
| Burma | 228 | 31 | 86 | 48 | 11 | |
| Ceylon | | | | 1 | | |
| China | 3 | | | | | |
| India | 34,167 | 9,074 | 5,537 | 3,314 | [3] 757 | [3] 852 |
| India (French) | 658 | 149 | 220 | 307 | | |
| India (Portuguese) | 58 | | 18 | | | |
| Indochina: | | | | | | |
| Cambodia | 55 | 7 | | 3 | 8 | |
| Viet Nam | 32 | 11 | 14 | 21 | | 47 |
| Indonesia: | | | | | | |
| Borneo | 266 | | | | | |
| Java | 77 | 1 | 7 | 9 | 2 | |
| Iran | 120 | 12 | 10 | 16 | | |
| Iraq | 100 | 1 | 3 | 5 | 2 | [4] 1 |
| Japan | 16 | 4 | [4] 1 | 1 | 1 | |
| Oman | | | 1 | | | |
| Pakistan | 10,600 | 1,739 | 454 | 255 | 9 | |
| Straits Settlements | 1 | | | | | |
| Thailand | 26 | | | | | |
| **EUROPE** | | | | | | |
| Great Britain: | | | | | | |
| England: | | | | | | |
| Brighton | 15 | | | | | |
| **SOUTH AMERICA** | | | | | | |
| British Guiana | 8 | | | | | |
| Ecuador | 21 | | | | | |

[1] Mar. 1–10, 1951. [2] Mar. 11–20, 1951. [3] Preliminary figure. [4] Imported.

## TYPHUS FEVER*

[Cases]

| Place | January–February 1951 | 3 | 10 | 17 | 24 | 31 |
|---|---|---|---|---|---|---|
| **AFRICA** | | | | | | |
| Algeria | 5 | | | | | |
| British East Africa: | | | | | | |
| Somaliland | 1 | | | | | |
| Egypt | 34 | 1 | | | 4 | 1 |
| Eritrea | 4 | | | | | |
| Ethiopia | 141 | 28 | 24 | | | |
| Libya: | | | | | | |
| Tripolitania | 1 | 1 | | | | |
| Morocco (French) | 1 | | [1] 1 | | | |
| Tunisia | 1 | | | | | |

## TYPHUS FEVER*—Continued

[Cases]

| Place | January–February 1951 | March 1951—week ended— 3 | 10 | 17 | 24 | 31 |
|---|---|---|---|---|---|---|
| **ASIA** | | | | | | |
| Afghanistan | 94 | 2 | 7 | | | |
| India | 10 | | 1 | 5 | | |
| India (Portuguese) | 12 | 5 | 2 | | | |
| Indochina: Viet Nam | 11 | | 1 | | | |
| Iran | 50 | 16 | 7 | 10 | | |
| Iraq | 5 | 1 | 1 | 4 | 2 | [1]1 |
| Israel | | | | 2 | | |
| Japan | 2 | | | | | |
| Pakistan | 5 | 3 | 1 | | | |
| Syria | | | 1 | | | |
| Transjordan | 1 | | 1 | 4 | 7 | |
| Turkey | 45 | | 1 | 3 | 3 | 6 |
| **EUROPE** | | | | | | |
| Yugoslavia | 21 | | | | | |
| **NORTH AMERICA** | | | | | | |
| Jamaica[2] | 1 | | | | | |
| Mexico | [3]1 | [4]7 | | | | |
| **SOUTH AMERICA** | | | | | | |
| Chile | 20 | | | | | |
| Ecuador | 100 | | | | | |
| Paraguay | 11 | | | | | |
| Venezuela[3] | 2 | | | | | |

Reports from some areas are probably murine type, while others include both murine and louse-borne types.

[1] Mar. 1–10, 1951. [2] Imported. [3] Includes murine type. [4] Murine.

## YELLOW FEVER

[C—cases; D—deaths]

| Place | | January–February 1951 | March 1951—week ended— 3 | 10 | 17 | 24 | 31 |
|---|---|---|---|---|---|---|---|
| **AFRICA** | | | | | | | |
| Gold Coast | C | [1]2 | | | [2]1 | [2]1 | |
| Accra | D | 1 | | | [2]1 | | |
| Sierra Leone | C | [1]1 | | [1]1 | | | |
| Koinadugu District | C | [1]1 | | [1]1 | | | |
| Freetown | C | [1]1 | | [1]1 | | | |
| **SOUTH AMERICA** | | | | | | | |
| Brazil | D | [3]400 | | | | | |
| Goiaz State | D | [4]10 | | | | | |
| Goiania | D | [4]1 | | | | | |
| Goiaz | D | [4]3 | | | | | |
| Niquelandia | D | [4]3 | | | | | |
| Porangatu | D | [4]1 | | | | | |
| Uruacu | D | [4]2 | | | | | |
| Matto Grosso State | D | 1 | | | | | |
| Colombia | D | 12 | | | | | |
| Boyaca Department | D | 1 | | | | | |
| Otanche | D | 1 | | | | | |
| Caqueta Commissary | D | 1 | | | | | |
| Montanita | D | 1 | | | | | |
| Meta Territory | C | 1 | | | | | |
| North Santander Department | D | 4 | | | | | |
| La Vega | D | 3 | | | | | |
| Rionegro | C | 1 | | | | | |
| Santander Department | D | 5 | | | | | |
| Campohermoso | D | 1 | | | | | |
| Guamales | D | 1 | | | | | |
| Maradales | D | 1 | | | | | |
| Tambo Redondo | D | 1 | | | | | |
| Veneoas | D | 1 | | | | | |

[1] Includes suspected cases. [2] Suspected. [3] The number of deaths from Dec. 1–Feb. 20, 1951, was estimated to be 400 and the number of cases was estimated to be 2,000. [4] Confirmed deaths.



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# Public Health Reports

VOLUME 66 MAY 4, 1951 NUMBER 18

TUBERCULOSIS CONTROL ISSUE NO. 63

IN THIS ISSUE



FEDERAL SECURITY AGENCY

PUBLIC HEALTH SERVICE

FEDERAL SECURITY AGENCY
*Oscar R. Ewing, Administrator*

PUBLIC HEALTH SERVICE
*Leonard A. Scheele, Surgeon General*

**Division of Public Health Methods**
*G. St. J. Perrott, Chief of Division*

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# Public Health Reports

*Vol. 66* • MAY 4, 1951 • *No. 18*

## Tuberculosis Mortality in the United States, 1949

### (With provisional figures for the first 11 months of 1950)

By Evelyn H. Halpin and Otis D. Turner*

Few diseases have shown the continuous, yearly decline in mortality exhibited by tuberculosis. Mortality from tuberculosis continued to decline in 1949, when 39,000 deaths from all forms of the disease occurred in continental United States. The death rate is estimated to be 26.2 per 100,000 population, excluding the armed forces overseas. These preliminary figures, which are based on a 10-percent sample of death certificates, are subject to a sampling error of ±1.8 percent.

In 1948, there were 43,833 deaths from tuberculosis (all forms), and the death rate was 30.0 per 100,000 population. After allowance is made for changes in procedure which affect comparability of data for the 2 years, the tuberculosis death rate decrease between 1948 and 1949 appears to be about 9 percent. Provisional figures for the first 11 months of 1950 indicate a further decrease of approximately 15 percent. The death rate for that period was 22.6 as compared with 26.7 for the corresponding period of 1949.

This report, the eighth (*1–7*) in a series of annual statistical summaries of mortality figures for tuberculosis, presents estimated data for 1949 and the first 11 months of 1950 which are based on a 10-percent sample of death certificates. The report also discusses the significant changes since 1948, as well as sampling errors, and the comparability of 1949 and 1950 data with data for previous years.

### Trend of the Tuberculosis Death Rate

The death rate for tuberculosis (all forms) has decreased almost continuously since 1900, except for a slight rise in 1917 and 1918. The

*Analytical Statisticians, National Office of Vital Statistics, and Division of Chronic Disease and Tuberculosis, respectively, Public Health Service.

This is the sixty-third of a series of special issues of Public Health Reports devoted exclusively to tuberculosis control. The special issues began March 1, 1946, and appear the first week of each month. The articles are reprinted as extracts. Effective with the July 5, 1946, issue, these extracts may be purchased from the Superintendent of Documents, Government Printing Office, Washington, D. C., for 10 cents a single copy. Subscriptions are obtainable at $1.00 per year, $1.25 foreign.

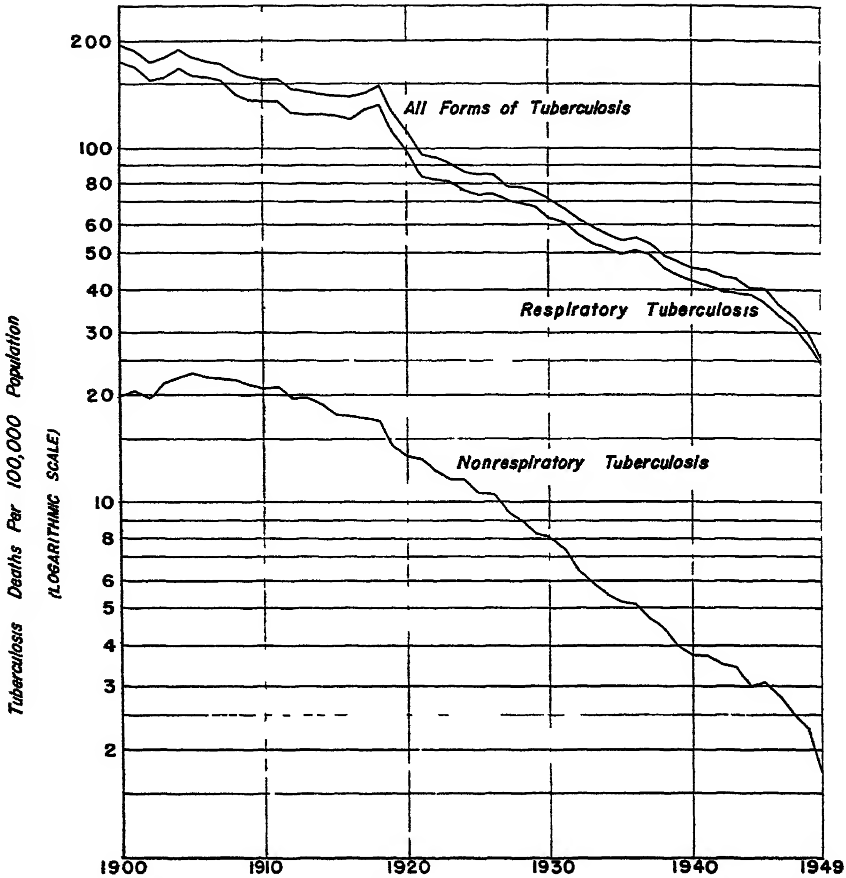


Figure 1. Death rates for tuberculosis (all forms), respiratory and nonrespiratory tuberculosis: death-registration States, 1900–1949. (The rates for 1949 are estimated from a 10-percent sample of death certificates).

interruption of the downward trend at the time of World War I was associated in part with the influenza epidemic. Death rates for respiratory tuberculosis and other forms of the disease for the period 1900–49 are shown on a semilogarithmic scale in figure 1, while data for all forms of the disease for 1940–49 appear in table 1.

Since 1918, the mortality rates for both respiratory and other forms of tuberculosis have decreased more rapidly than they did between 1900 and 1916. Comparison of the slopes of the curves for respiratory and nonrespiratory tuberculosis death rates, shows that the rate for the latter went down even more sharply than the rate for the former between 1921 and 1945. From 1945 to 1948, the relative decrease in the death rates for the two types of tuberculosis was about the same.

Between 1948 and 1949 the death rate for nonrespiratory tuberculosis appears to have been cut by one-fourth. This is a significant

Table 1. *Deaths and death rates for tuberculosis (all forms), by race and sex: United States, 1940–49*

Exclusive of deaths among armed forces overseas. Rates per 100,000 estimated midyear population in each specified group, excluding armed forces overseas]

| Year | All races | | | White | | | Nonwhite | | |
|---|---|---|---|---|---|---|---|---|---|
| | Both sexes | Male | Female | Both sexes | Male | Female | Both sexes | Male | Female |
| | **Number** | | | | | | | | |
| 1949 [1] | 39,032 | 25,483 | 13,549 | 27,683 | 18,712 | 8,971 | 11,349 | 6,771 | 4,578 |
| 1948 | 43,833 | 28,552 | 15,281 | 31,750 | 21,616 | 10,134 | 12,083 | 6,936 | 5,147 |
| 1947 | 48,064 | 30,585 | 17,479 | 34,783 | 23,167 | 11,616 | 13,281 | 7,418 | 5,863 |
| 1946 | 50,911 | 31,886 | 19,025 | 37,340 | 24,283 | 13,057 | 13,571 | 7,603 | 5,968 |
| 1945 | 52,916 | 32,934 | 19,982 | 38,623 | 25,055 | 13,568 | 14,293 | 7,879 | 6,414 |
| 1944 | 54,731 | 33,717 | 21,014 | 39,958 | 25,596 | 14,362 | 14,773 | 8,121 | 6,652 |
| 1943 | 57,005 | 34,786 | 22,219 | 41,209 | 26,162 | 15,047 | 15,796 | 8,624 | 7,172 |
| 1942 | 57,690 | 34,801 | 22,889 | 41,306 | 25,899 | 15,407 | 16,384 | 8,902 | 7,482 |
| 1941 | 59,251 | 34,966 | 24,285 | 42,283 | 25,957 | 16,326 | 16,968 | 9,009 | 7,959 |
| 1940 | 60,428 | 35,795 | 24,633 | 43,211 | 26,598 | 16,613 | 17,217 | 9,197 | 8,020 |
| | **Rate** | | | | | | | | |
| 1949 [1] | 26.2 | 34.6 | 18.1 | 20.8 | 28.3 | 13.4 | 72.2 | 88.2 | 56.9 |
| 1948 | 30.0 | 39.4 | 20.8 | 24.3 | 33.3 | 15.4 | 78.4 | 92.1 | 65.4 |
| 1947 | 33.5 | 43.0 | 24.2 | 27.1 | 36.3 | 18.0 | 88.1 | 100.6 | 76.1 |
| 1946 | 36.4 | 46.2 | 26.9 | 29.8 | 39.2 | 20.6 | 92.3 | 106.2 | 79.2 |
| 1945 | 40.1 | 53.0 | 28.6 | 32.7 | 45.1 | 21.7 | 102.6 | 120.9 | 86.5 |
| 1944 | 41.3 | 53.1 | 30.5 | 33.7 | 45.0 | 23.3 | 106.2 | 122.7 | 91.3 |
| 1943 | 42.6 | 52.9 | 32.6 | 34.3 | 44.4 | 24.7 | 112.9 | 126.4 | 100.0 |
| 1942 | 43.1 | 52.3 | 34.0 | 34.4 | 43.3 | 25.6 | 118.4 | 131.4 | 106.0 |
| 1941 | 44.5 | 52.5 | 36.5 | 35.4 | 43.3 | 27.4 | 124.2 | 134.3 | 114.5 |
| 1940 | 45.8 | 54.1 | 37.5 | 36.5 | 44.7 | 28.2 | 127.6 | 138.7 | 116.9 |

[1] Estimated from a 10-percent sample of death certificates classified by the Sixth Revision of the International List.

decrease even after allowance is made for a sampling error of 6.7 percent. On the other hand, the net decrease between 1948 and 1949 in the death rate for respiratory tuberculosis amounted to only 8 percent.

Over the past 50 years, the death rate for respiratory tuberculosis has decreased 86 percent from 174.5 per 100,000 population in 1900 to 24.5 in 1949. In the same period, the rate for other forms of the disease has declined 91 percent, from 19.9 to 1.7.

## Comparability of Data

At the beginning of 1949, several changes were made in mortality reporting and classification procedures which should be considered in comparing data for 1949 and previous years. These changes were: (1) revision of the list of causes of death which is used for classification; (2) a change in the principle of selecting the cause of death for primary tabulation purposes; and (3) changes in the death certificate form on which physicians report the cause or causes of death.

The International List of Causes of Death, which is used for classifying deaths, is revised decennially. The Sixth Revision (*8*) of this list became effective in 1949 and deaths reported in that year were

classified according to its categories. Deaths in 1939–48, however, were classified according to the Fifth Revision. Although the Sixth Revision provides for more detailed subdivision of tuberculosis than the Fifth, when the whole categories of respiratory tuberculosis and nonrespiratory tuberculosis are considered, the two revisions correspond closely.

Changes in the method of selecting one cause of death for statistical purposes in 1949, however, make data for that and subsequent years not strictly comparable with those for earlier years. In 1949, the principle of having the physician indicate the underlying cause of death for primary tabulations when reporting more than one cause was introduced in the United States. This is in accordance with regulations of the World Health Organization (*9*) and is in contrast to the previous procedure, based on the use of priority tables in the Manual of Joint Causes of Death (*10*). Under the latter procedure for selecting one cause of death when two or more were named on the death certificate, all of the diseases or conditions mentioned were taken into consideration, regardless of the sequence in which they were reported. The new form of medical certification on the death certificate, adopted in 1949, is designed to facilitate reporting of the *underlying* cause of death when more than one condition is involved.

The most important change in the reporting and classification procedure is from the use of priority tables to selection of the underlying cause reported by the physician. In the priority tables used until 1949, tuberculosis took precedence over most other causes even when it was only contributory to another pathological condition reported with it. Under the new procedure, when tuberculosis is mentioned as a contributory cause of death, but heart disease, cancer, or some other condition is named as the underlying cause, the death is assigned to the latter. Thus, under the procedure introduced in 1949, tuberculosis loses some of its former priority and yields to other chronic diseases or conditions when they are considered more important in the physician's opinion.

An index of the effect of these changes on cause-of-death statistics has been obtained through the development of comparability ratios (table 2). Deaths in 1949 were classified separately according to the Fifth Revision (using the Joint Cause Manual) and also by the Sixth Revision, selecting the underlying cause of death. Comparability ratios were then calculated by dividing the number of deaths arrived at under the Sixth Revision by the number arrived at under the Fifth. These ratios are important in comparing mortality statistics for 1949 and earlier years, since they make it possible to determine to what extent a change in the number of deaths assigned to a cause is due to the change in the certification and classification procedures, as contrasted with a real change in the force of mortality. It should be

Table 2. *Percentage changes in death rates for tuberculosis, by age, 1948 to 1949 and comparability ratios for tuberculosis deaths classified by the Sixth and Fifth Revisions, by age: United States, 1949*

| Age (years) | Tuberculosis (all forms) | | | Respiratory tuberculosis | | | Tuberculosis, other forms | | |
|---|---|---|---|---|---|---|---|---|---|
| | Total percentage change 1948–49 [1] | Comparability ratio 1949 [2] | Net percentage change 1948–49 [3] | Total percentage change 1948–49 [1] | Comparability ratio 1949 [2] | Net percentage change 1948–49 [3] | Total percentage change 1948–49 [1] | Comparability ratio 1949 [2] | Net percentage change 1948–49 [3] |
| All ages | −12.7 | 0.958 | −8.7 | −11.6 | 0.956 | −7.5 | −26.1 | 0.986 | −26.1 |
| Under 1 | −4.0 | .971 | −1.0 | −11.9 | .923 | −5.1 | 0 | 1.000 | 0 |
| 1–14 | −8.1 | .985 | −5.6 | +6.3 | .912 | +13.3 | −19.0 | 1.062 | −22.7 |
| 15–24 | −17.3 | .991 | −16.4 | −17.1 | .983 | −15.5 | −20.0 | 1.074 | −25.0 |
| 25–44 | −13.2 | .981 | −11.6 | −11.5 | .979 | −9.7 | −38.1 | 1.033 | −40.9 |
| 45–64 | −13.6 | .953 | −9.3 | −12.5 | .952 | −8.1 | −30.8 | .984 | −30.8 |
| 65–74 | −12.2 | .920 | −4.6 | −12.0 | .927 | −5.1 | −14.6 | .811 | +6.1 |
| 75 and over | −2.0 | .909 | +7.8 | −0.1 | .918 | +8.8 | −33.3 | .733 | −9.7 |

[1] Computed from rates based on final 1948 data classified by the Fifth Revision and 1949 data estimated from a 10-percent sample classified by the Sixth Revision.
[2] Ratio of deaths in a 10-percent sample classified by the Sixth Revision of the International List to deaths classified by the Fifth Revision.
[3] Computed from rates based on final 1948 data with allowance for change in classification and 1949 data estimated from a 10-percent sample classified by the Sixth Revision.

noted, however, that the ratios are provisional since they are based on the 10-percent sample.

The provisional comparability ratios (table 2) which indicate the combined effect of the changes in procedures in 1949 mentioned above show that deaths from tuberculosis (all forms) at all ages, when classified by the Sixth Revision and the new procedures, are 95.8 percent of the number assigned to tuberculosis by the Fifth Revision and the previous method of joint-cause selection. The comparability ratio of 0.958 may be used to determine what part of the difference between the crude death rate for tuberculosis in 1949 and its counterpart for 1948 is due to a difference in comparability, and what part reflects a real change in mortality. When the tuberculosis death rate of 30.0 for 1948 is multiplied by the comparability ratio of 0.958, the rate of 28.7 so obtained is comparable to the rate of 26.2 for tuberculosis in 1949, since it indicates approximately what the rate would have been in 1948 if the data had been classified by the Sixth Revision. Consequently, the net decrease from 1948 to 1949 which may be regarded as a real change in mortality is 2.5 deaths per 100,000, or 8.7 percent.

Examination of the comparability ratios in table 2 shows that there is some variation in the comparability at different ages. The ratio decreases from 0.991 for deaths of persons 15 to 24 years to 0.909 for persons 75 years and over. For deaths at ages under 45 years, disagreement between the two procedures is less than 3 percent, since the ratios range from 0.971 for infants to 0.991 for deaths in the age group 15 to 24 years. In the older age groups, from 4.7 to 9.1 percent fewer deaths were assigned to tuberculosis by the Sixth than by the Fifth Revision.

Comparability ratios computed separately for respiratory tuberculosis and other forms of the disease by age show that in the three age groups between 1 and 44 years, fewer deaths are classified as respiratory tuberculosis by the Sixth Revision than by the Fifth, but more fall into the nonrespiratory tuberculosis group. However, since the ratios for nonrespiratory forms of the disease are based on small frequencies in the sample, a small relative increase in the number of deaths assigned to nonrespiratory tuberculosis by the Sixth Revision is not significant.

Under the Sixth Revision, fewer deaths at the older ages were assigned to both respiratory and nonrespiratory tuberculosis. This would indicate that physicians regard such conditions as diseases of the heart, vascular lesions affecting the central nervous system, and cancer as the underlying cause of death, even though tuberculosis is also present.

With regard to race and sex, there is some variation in the comparability ratios for tuberculosis. Fewer deaths of white persons are assigned to tuberculosis by the new classification procedure than when the Joint Cause Manual and Fifth Revision are used. The ratios are 0.938 for respiratory, and 0.963 for other forms of the disease. On the other hand, there is close correspondence between the numbers of deaths of nonwhites assigned to respiratory tuberculosis by the two classification procedures, the ratio being 1.003. There is a small, but insignificant increase in the number of deaths of nonwhites assigned to nonrespiratory forms of the disease by the new procedures.

The difference between comparability ratios for whites and nonwhites is probably associated with the fact that more than one cause of death is reported on a larger proportion of death certificates for white persons than for nonwhites. This is more likely to result in assignment of the death to a cause other than tuberculosis when the physician designates the underlying cause, than when the priority tables of the Joint Cause Manual are used.

For deaths of white persons, comparability ratios for males and females are different. The ratio for respiratory tuberculosis for white males is 0.926 as compared with 0.967 for white females. For deaths from nonrespiratory tuberculosis, the ratios are 0.944 for white males and 0.988 for females. This difference in comparability ratios, which is not apparent for nonwhites, may be associated with differences in the proportion of certificates on which more than one cause of death is reported. On the other hand, if confirmed by final figures, this difference in the ratios for males and females may suggest that tuberculosis ends fatally in the absence of other significant diseases relatively more often among females than among males.

It should be noted that comparability ratios have been computed

by age alone, irrespective of race and sex. Therefore, when comparing the data for 1949 with those of 1948 (tables 4 and 6), allowance can be made for changes in comparability by age only by applying the comparability ratios shown in table 2 to figures for all races and both sexes.

## Deaths and Death Rates

In 1949, the total estimated number of tuberculosis deaths were distributed as follows: 36,400, or 93 percent, were attributed to respiratory tuberculosis and the remaining 2,600, or 7 percent, to the nonrespiratory forms of the disease. It is therefore evident that respiratory tuberculosis deaths continue to constitute an increasingly greater proportion of all deaths from the disease.

An examination of tuberculosis mortality data by race and sex (table 3) shows higher death rates among males than females and among nonwhites than whites. Data for respiratory tuberculosis, which constitutes over 90 percent of all deaths from the disease, show a similar distribution pattern. The respiratory tuberculosis mortality rate of 32.5 for males is almost twice that of 16.6 per 100,000 for females, and the rate of 66.3 for nonwhites is more than 3 times the rate of 19.6 for whites. For the two sexes within each racial group, the relative difference appears to be greater for whites than for nonwhites. The rate of 26.9 for white males is more than double the rate of 12.3 for white females, whereas the rate of 80.8 for nonwhite males is 54 percent higher than that of 52.5 for nonwhite females.

Table 3. *Estimated deaths and death rates for tuberculosis of the respiratory system and for other forms, by race and sex: United States, 1949*

[Estimated from a 10-percent sample of death certificates classified by the Sixth Revision of the International List. Exclusive of deaths among armed forces overseas. Rates per 100,000 estimated midyear population in each specified group, excluding armed forces overseas].

| Race and sex | Respiratory tuberculosis | | | Other forms of tuberculosis | | |
|---|---|---|---|---|---|---|
| | Number | Rate | Percent error | Number | Rate | Percent error |
| All races | 36,444 | 24.5 | 1.8 | 2,588 | 1.7 | 6.7 |
| Male | 23,988 | 32.5 | 2.0 | 1,495 | 2.0 | 8.2 |
| Female | 12,456 | 16.6 | 2.8 | 1,093 | 1.5 | 9.6 |
| White | 26,023 | 19.6 | 1.9 | 1,660 | 1.2 | 7.8 |
| Male | 17,790 | 26.9 | 2.4 | 922 | 1.4 | 10.4 |
| Female | 8,233 | 12.3 | 3.5 | 738 | 1.1 | 11.6 |
| Nonwhite | 10,421 | 66.3 | 3.1 | 928 | 5.9 | 10.4 |
| Male | 6,198 | 80.8 | 4.0 | 573 | 7.5 | 13.2 |
| Female | 4,223 | 52.5 | 4.9 | 355 | 4.4 | 16.8 |

Mortality from nonrespiratory tuberculosis evidences race-sex differentials similar to those for mortality from respiratory tuberculosis. The rate for males is 33 percent higher than the rate for females and the rate for nonwhites is nearly five times that of whites.

The ratio of respiratory tuberculosis to other forms of the disease is 50 percent greater for white males than for any other population group.

*Death Rates by Age and Race*

Generally, the tuberculosis mortality patterns for age and race, and for age and sex observed in 1948 also hold true for the estimates for 1949, exhibiting the usual peaks in infancy and old age.

Variations in the rates with age show the same general tendencies for both races (table 4 and fig. 2), but the points of greatest mortality tend to occur at a slightly younger age for nonwhites than for whites. For both races, the lowest rates are in the age group 1–14 years. The rate rises continuously and reaches a peak for whites in the age group 75 years and over, but this maximum for nonwhites is attained earlier, in the 65–74 age group.

As in 1948, variations in mortality for whites and nonwhites are particularly striking. The mortality peak among nonwhites is 82.1 percent higher than the peak for whites. The rate of 72.2 for nonwhites of all ages is over three times that of 20.8 for whites. For whites, the estimated age-specific rates for tuberculosis (all forms) showed significant decreases from 1948 to 1949 for persons in the age groups from 15–64 years. Taking into account the comparability ratio, it appears that the greatest percentage decrease, amounting to 20 percent, occurred in age group 15–24. There was no significant

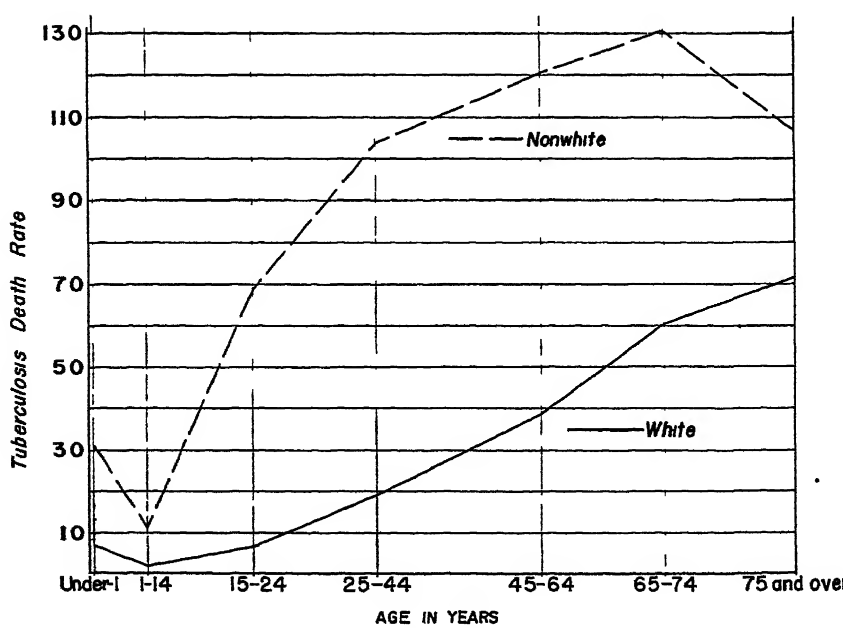


Figure 2. Estimated death rates for tuberculosis (all forms) by age and race: United States, 1949.

Table 4. *Deaths and death rates for tuberculosis (all forms), by age and race: United States, 1948 and 1949*

[Deaths for 1949 estimated from a 10-percent sample of death certificates classified by the Sixth Revision of the International List. Deaths for 1948 classified by the Fifth Revision. Exclusive of deaths among armed forces overseas. Rates per 100,000 estimated midyear population in each specified group, excluding armed forces overseas]

| Race and year | Total | Under 1 year | 1–14 years | 15–24 years | 25–44 years | 45–64 years | 65–74 years | 75 years and over |
|---|---|---|---|---|---|---|---|---|
| | **Number** | | | | | | | |
| All races: | | | | | | | | |
| 1949 | 39,032 | 315 | 1,248 | 3,198 | 12,459 | 14,008 | 4,993 | 2,675 |
| 1948 | 43,833 | 325 | 1,311 | 3,933 | 14,164 | 15,902 | 5,545 | 2,623 |
| White: | | | | | | | | |
| 1949 | 27,683 | 200 | 680 | 1,347 | 7,762 | 10,902 | 4,340 | 2,386 |
| 1948 | 31,750 | 190 | 803 | 1,811 | 8,962 | 12,663 | 4,893 | 2,410 |
| Nonwhite: | | | | | | | | |
| 1949 | 11,349 | 115 | 568 | 1,851 | 4,727 | 3,106 | 653 | 289 |
| 1948 | 12,083 | 135 | 508 | 2,122 | 5,202 | 3,239 | 652 | 213 |
| | **Rate** | | | | | | | |
| All races: | | | | | | | | |
| 1949 | 26.2 | 9.6 | 3.4 | 14.3 | 28.3 | 45.7 | 65.0 | 74.6 |
| 1948 | 30.0 | 10.0 | 3.7 | 17.3 | 32.6 | 52.9 | 74.0 | 76.1 |
| White: | | | | | | | | |
| 1949 | 20.8 | 6.9 | 2.1 | 6.9 | 19.6 | 38.9 | 60.4 | 71.9 |
| 1948 | 24.3 | 6.6 | 2.6 | 9.0 | 23.0 | 45.9 | 69.9 | 75.5 |
| Nonwhite: | | | | | | | | |
| 1949 | 72.2 | 31.0 | 11.8 | 69.3 | 104.4 | 120.2 | 130.9 | 107.8 |
| 1948 | 78.4 | 36.1 | 11.0 | 78.9 | 116.2 | 128.7 | 133.0 | 83.5 |

change in the rates for nonwhites from 1948 to 1949, according to estimates based on the 10-percent sample. The percentage errors of the estimated numbers of deaths and death rates for 1949 by age, race, and sex appear in table 5.

### *Death Rates by Age and Sex*

Death rates specific for sex as well as age are shown in table 6. The mortality pattern for males is similar for both 1948 and 1949, with the low and high points of the curve occurring at the same age-groups—low at 1–14 years and rising to a peak at 65–74 years. For females, the death rate decreases after infancy, and is lowest in the 1–14-year age group. The curve, which is somewhat W-shaped, rises in the 25–44-year age group to 24.0, after which it again drops off; then it registers a comparatively pronounced rise in the last two age groups, reaching a maximum of 57.4 at 75 years and over.

Table 5. *Estimated percentage sampling error of estimated number of deaths and death rates for tuberculosis (all forms), by age, race, and sex: United States 1949*

| Race and sex | Total | Under 1 year | 1–14 years | 15–24 years | 25–44 years | 45–64 years | 65–74 years | 75 years and over |
|---|---|---|---|---|---|---|---|---|
| All races, both sexes | 1.8 | 17.8 | 9.0 | 5.6 | 2.8 | 2.7 | 4.5 | 6.1 |
| White | 1.9 | 22.4 | 12.1 | 8.6 | 3.6 | 3.0 | 4.8 | 6.5 |
| Nonwhite | 3.0 | 29.5 | 13.3 | 7.4 | 4.6 | 5.7 | 12.4 | 18.6 |
| Male | 2.0 | 25.5 | 13.3 | 8.9 | 3.8 | 3.0 | 5.2 | 8.0 |
| Female | 2.7 | 24.9 | 12.1 | 7.2 | 4.3 | 6.0 | 8.6 | 9.4 |

Table 6. *Deaths and death rates for tuberculosis (all forms), by age and sex: United States, 1948 and 1949*

[Deaths for 1949 estimated from a 10-percent sample of death certificates classified by the Sixth Revision of the International List. Deaths for 1948 classified by the Fifth Revision. Exclusive of deaths among armed forces overseas. Rates per 100,000 estimated midyear population in each specified group, excluding armed forces overseas]

| Sex and year | Total | Under 1 year | 1-14 years | 15-24 years | 25-44 years | 45-64 years | 65-74 years | 75 years and over |
|---|---|---|---|---|---|---|---|---|
| | Number | | | | | | | |
| Both sexes: | | | | | | | | |
| 1949 | 39,032 | 315 | 1,248 | 3,198 | 12,489 | 14,008 | 4,993 | 2,675 |
| 1948 | 43,833 | 325 | 1,311 | 3,933 | 14,164 | 15,902 | 5,545 | 2,623 |
| Male: | | | | | | | | |
| 1949 | 25,483 | 154 | 565 | 1,250 | 7,075 | 11,187 | 3,626 | 1,550 |
| 1948 | 28,552 | 172 | 631 | 1,526 | 8,035 | 12,529 | 3,974 | 1,666 |
| Female: | | | | | | | | |
| 1949 | 13,549 | 161 | 683 | 1,948 | 5,414 | 2,821 | 1,367 | 1,125 |
| 1948 | 15,281 | 153 | 680 | 2,407 | 6,129 | 3,373 | 1,571 | 957 |
| | Rate | | | | | | | |
| Both sexes: | | | | | | | | |
| 1949 | 26.2 | 9.6 | 3.4 | 14.3 | 28.3 | 45.7 | 65.0 | 74.6 |
| 1948 | 30.0 | 10.0 | 3.7 | 17.3 | 32.6 | 52.9 | 74.0 | 76.1 |
| Male: | | | | | | | | |
| 1949 | 34.6 | 9.2 | 3.0 | 11.3 | 32.9 | 73.5 | 97.6 | 95.1 |
| 1948 | 39.4 | 10.4 | 3.5 | 13.5 | 37.9 | 83.5 | 109.5 | 105.8 |
| Female: | | | | | | | | |
| 1949 | 18.1 | 10.1 | 3.8 | 17.3 | 24.0 | 18.3 | 34.5 | 57.4 |
| 1948 | 20.8 | 9.7 | 3.9 | 21.0 | 27.5 | 22.4 | 40.7 | 51.0 |

For males, the mortality rate exceeds the rate for females for all age groups, except under 25 years, and the total rate for males is nearly twice as high as the rate for females. Even though the death rate for females rises more steeply than the rate for males from 1–14 years to 15–24, it levels off subsequently, and the two lines formed by the rates cross between the 15–24 and 25–44-year age groups (fig. 3). This same crossing of the two lines has been observed in tuberculosis prevalence rates based on chest X-ray survey data.

For males in the age groups between 25–64, there were significant decreases from 1948 to 1949. In the age groups under 25 and 65 and over, on the other hand, no significant change in mortality was recorded. Tuberculosis mortality rates for females also declined from 1948 to 1949 with decreases occurring in the age groups from 15–64 years. The changes for the remaining age groups among the females which appear as increases for the youngest and oldest groups, are not significant. Consequently, it is concluded that no change in mortality occurred for females under 15 years or 65 years and over.

### *Provisional Death Rates for 1950*

Provisional figures for 1950, based on a 10-percent mortality sample for January through November, show a further pronounced decline in the tuberculosis death rate amounting to 15 percent. The death rate for this period of 1950 was 22.6, as compared with 26.7 for January to November, 1949. Death rates by age for the first 11

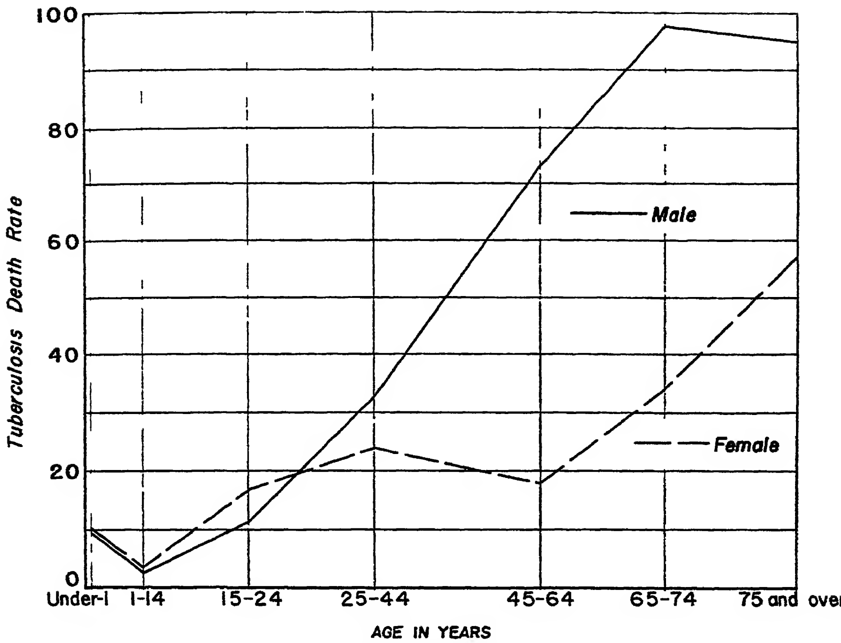


Figure 3. Estimated death rates for tuberculosis (all forms) by age and sex: United States, 1949.

months of 1950 are shown in table 7 for all forms of tuberculosis, together with comparable ones for the corresponding period of 1949. These figures show significant decreases for each age group except those under 15 years and 75 years and over. On a relative basis, the decreases range from nearly 9 percent for the group 65–74 years to 23 percent for the 25–44-year age group. For the youngest and the oldest age groups, however, there is no significant difference between the rates for the two periods. Since the underlying cause of death was selected and the Sixth Revision used for both the 1949 and the

Table 7. *Provisional death rates for tuberculosis (all forms), by age: reporting area,*[1] *January–November, 1949 and 1950*

[Based on a 10-percent sample of death certificates received monthly in State Vital Statistics offices. Exclusive of deaths among armed forces overseas. Rates on an annual basis per 100,000 estimated population in each specified age group, excluding armed forces overseas]

| Age (years) | January-November | |
|---|---|---|
| | 1950 | 1949 |
| All ages | 22.6 | 26.7 |
| Under 15 | 3.7 | 4.2 |
| 15-24 | 11.9 | 15.1 |
| 25-44 | 22.2 | 28.9 |
| 45-64 | 41.2 | 46.0 |
| 65-74 | 60.5 | 66.4 |
| 75 and over | 69.5 | 74.0 |

[1] The reporting area covered the United States with the exception of certain cities which were excluded in 1 or more months.

1950 data, there is no question of comparability, and the rates can be compared directly.

The decrease in tuberculosis mortality in 1950 appears to have taken place rather generally throughout the United States. Although figures by State cannot be estimated from the 10-percent sample, the provisional death rates for the four geographic regions of the country (table 8) indicate significant decreases in each region. It is likely that the relative decrease was slightly less in the Northeastern States (11 percent) than in the other regions. It is encouraging to see that the death rate for tuberculosis declined further in 1950 and that the rate of decline, which has increased since 1945, was at least as great as in 1949.

Table 8. *Deaths in a 10-percent sample and provisional death rates for tuberculosis (all forms), by geographic region: reporting area,*[1] *January-November, 1949 and 1950*

[By place of death. Exclusive of deaths among armed forces overseas. Rates on annual basis per 100,000 estimated population excluding armed forces overseas]

| Area | January-November | | January-November | |
|---|---|---|---|---|
| | 1950 | 1949 | 1950 | 1949 |
| | Number | | Rate | |
| Reporting area | 3,124 | 3,623 | 22.6 | 26.7 |
| Northeastern States | 875 | 971 | 24.0 | 27.0 |
| North Central States | 762 | 900 | 18.5 | 22 1 |
| Southern States | 1,108 | 1,296 | 26.1 | 31.0 |
| Western States | 379 | 456 | 21.1 | 26.7 |

[1] The reporting area covered the United States with the exception of certain cities which were excluded in 1 or more months.

NOTE: The Northeast includes the New England and Middle Atlantic States; the North Central Region includes the East and West North Central States; the South includes the South Atlantic, East and West South Central States; the West includes the Mountain and Pacific States.

## Source and Limitations of the Data

The 10-percent sample of death certificates, from which the estimates for 1949 and provisional figures for the first 11 months of 1949 and 1950 have been made, is a systematic sample drawn monthly in State vital statistics offices. Transcripts of the sample death certificates are forwarded to the Public Health Service where shipments from each State and the District of Columbia are classified and tabulated monthly.

Estimates of the 1949 tuberculosis deaths are made by multiplying the sample frequency by 10 and adjusting the figure proportionately, together with data for other causes, to an independent estimate of all deaths based on a complete count of death certificates received in State vital statistics offices. Correction for bias in the sample returns is made in proportion to the underreporting or overreporting in the 1947 and 1948 samples, which have been compared with the final

figures for those years. The estimated percentage errors shown in table 5 reflect random sampling variation.

The death rates discussed in this report are based on the estimated population of the United States, excluding members of the armed forces overseas. The population estimates are provided by the Bureau of the Census. For the war years, the difference between the population excluding the armed forces abroad and that which includes them makes an appreciable difference in the death rates for tuberculosis. However, for more recent years, the difference is very small. In 1949, there was a difference of less than 1 percent between rates for males computed from the two populations, and no difference in the crude death rate for tuberculosis (7).

## Summary

This report presents data on tuberculosis mortality in the United States derived from a 10-percent sample of death certificates in 1949 and the first 11 months of 1950, summarizing the changes which have occurred. Included is a discussion of factors which affect the comparability of data for 1949 and 1950 with those for earlier years, and provisional comparability ratios are given. In 1949 4 percent fewer deaths are assigned to tuberculosis (all forms) by the classification procedures and the Sixth Revision of the International List of Causes of Death introduced in 1949 than by the Fifth Revision and Joint Cause Manual.

Deaths from all forms of tuberculosis in 1949 are estimated to have numbered 39,000. The estimated death rate of 26.2 per 100,000 population is 9 percent lower than the rate for 1948, after allowance is made for the changes in classification procedure. A further decrease of approximately 15 percent appears to have occurred in 1950. Changes in mortality from both respiratory tuberculosis, which accounts for 93 percent of the deaths, and nonrespiratory forms of the disease contribute to the decreases.

Among white persons, decreases in the death rate between 1948 and 1949 appear to have been confined to the 15–64-year age groups. In the preliminary figures, no change was recorded in the death rates for nonwhite groups.

Death rates by age for both males and females, irrespective of race, were lower in 1949 than in 1948. The significant decreases were those recorded for males between the ages of 25 and 64 years and for females aged 15 to 64 years. In comparing age-specific tuberculosis death rates for January through November 1950 with those for the corresponding period of 1949, it is found that decreases occurred for persons between 15 and 64 years of age. The four geographic regions shared in the decreases in the death rate for all forms of tuberculosis in 1950.

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(*9*) World Health Organization Regulations No. 1 regarding nomenclature with respect to diseases and causes of death: Article 12, ibid. p. 374.

(*10*) Manual of the International List of Causes of Death (Fifth Revision) and Joint Causes of Death (fourth edition). Department of Commerce, Bureau of the Census, Washington, D. C., 1939.

# Experimental Error in the Determination of Tuberculin Sensitivity

By Sven Nissen Meyer, M.D., Anna Hougen, Cand. Act., and Phyllis Edwards, M.D.*

In tuberculin testing, the size of a skin reaction is frequently used as a measure of the degree of tuberculin sensitivity without regard for the unavoidable errors in the technical procedures of giving and reading the tests.

With an exactly measured dose of tuberculin, a uniform technique, and faultless measurement of the reaction, a theoretically exact determination of sensitivity should be possible. In practice, however, such conditions can never be fulfilled. Small uncontrollable variations will always occur in the amount of tuberculin injected, in the depth of injections, and in defining the boundary of the induration.

These variations will cause the observed value of a reaction to deviate more or less from what may be called "the true level of sensitivity" of the person in question. Sometimes a whole series of small errors may act in one direction, causing the observed value to deviate considerably from the true. More often the individual errors of an observation will be partly positive, partly negative, and thus to some extent neutralize each other, resulting in a smaller total error. It is for this reason that experimental errors, expressed as positive or negative deviations from the true value, usually have an approximately normal distribution with a mean around zero.

An estimate of the "true value" of sensitivity and of the quantitative importance of experimental error would be obtained if it were possible to measure the sensitivity many times by repeated tests in the same person. The mean of all the observations, provided their distribution is fairly symmetrical, would then be an estimate of the true value of the sensitivity level. The standard deviation of the distribution, or its variance (i. e., the square of the standard deviation) would be a measure of the magnitude of variations caused by all uncontrollable factors in the technique employed. This measure would depend explicitly on the investigator; a careful tester would, by using the same method routinely, obtain a smaller dispersion in his results than a less precise worker.

Testing the same person many times is, however, rarely feasible and in addition it is possible that sensitivity may change during, or

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even be changed by, the investigation. Information about experimental error can be obtained, however, by simultaneously giving duplicate tests with the same dose of tuberculin to a sufficient number of persons. The two corresponding reactions will reflect the same level of sensitivity and the difference between them will be caused by all experimental errors involved in both tests. The distribution of these differences in the total group will have a variance twice as large as the variance of the experimental error

The total experimental error can be regarded as a sum of two main components—errors made in giving tuberculin and errors made in reading the reactions. An estimate of the latter can be obtained when one person makes duplicate readings of the same reactions. The distribution of the difference between the two readings, as with duplicate reactions, will have a variance twice as large as the variance of the reading error.

In a series of studies designed primarily for other purposes and conducted during May–November 1950 by the Tuberculosis Research Office of the World Health Organization, it was frequently possible to perform duplicate testing and reading. These data have been utilized in order to estimate the magnitude of errors involved in determining tuberculin sensitivity.

## Technique

The same general principles for technique and procedure were used in six different investigations from which material is derived for this study.

The research personnel were nurses who had been carefully trained and were considerably experienced in the type of work being performed. Throughout each study the same individual gave all the tests and another read all the reactions in order to minimize variations due to personal differences in technique. To avoid bias in reading reactions, the reader had no knowledge of the dose of tuberculin used, previous reactions of the subject, or observations made by another reader when there was one. Secretaries recorded all results, so the readers had no opportunity to see the cards.

Tests in all six studies were given by the Mantoux method, intradermally in the dorsal forearm, injecting 0.1 cc. of carefully measured PPD, batch RT XIX–XX–XXI,[1] freshly prepared at the State Serum Institute in Copenhagen. When one person was given two tests simultaneously, care was taken that the injections were placed as symmetrically as possible on the two arms.

All readings were made after 3 days. Erythema was first measured and recorded, then the reaction was carefully palpated and the transverse diameter of the induration was measured. Finally, qualitative

[1] RT XXII used in Study III.

characteristics of reactions were observed by classifying induration into four groups or types.[2] Type I is a very dense, hard, elevated induration, occasionally accompanied by ulceration. Type IV, at the other extreme, is a soft, indefinite reaction, perhaps best described as an edematous swelling which might be missed unless carefully palpated. Types II and III represent intermediate degrees of density. Type II is characterized as less dense and less elevated than type I. Type III indurations are those which, though clearly and definitely palpable, are not so dense as type II.

## Material

*Study I*, planned specifically to investigate experimental error in tuberculin testing, was carried out in Oslo among 114 persons, of whom 99 were medical students and 15 were office personnel. There were 91 men and 23 women ranging in age from 19 to 49 years with 85 percent between 20 and 29 years. Seventy-five men and 18 women were previously BCG-vaccinated; the rest stated that they had been positive to previous tuberculin tests.

The study plan was to give all persons two simultaneous tests with 10 T.U.,[3] one test in each arm. Since 32 persons refused this dose, they were tested with 5 T.U. in each arm, and the other 82 received 10 T.U. as planned. Taking groups of about 30 persons, 2 readers first read all reactions in the left arm, then all reactions in the right arm, and, finally, each reaction in the left arm again.

*Study II*, designed primarily to determine the degree of reaction to different doses of tuberculin, was carried out in a rural district of Denmark among 557 school children ranging in age from 8 to 15 years. Each child was given 5 T.U. in one arm, alternating between left and right. In the other arm one of the following doses was given: 1 T.U., 5 T.U., 10 T.U. Reading of the reaction on the left arm was followed immediately by reading of the right arm. The 124 out of 375 previously BCG-vaccinated children, who, because of the randomization of tests, received 5 T.U. in both arms, were used for the present purpose. Ninety-nine out of these 124 children were also read by a second reader in reading a sample of the entire group of 557.

*Study III*, a somewhat similar study, was carried out at a mental hospital in Denmark. Of the 1,852 patients tested, there were 839 men and 1,013 women ranging in age from 15 to 95 years. Two teams were used, team I testing the relatively quiet, ambulatory patients and team II testing the unruly or bedridden patients. All patients were given 5 T.U. in one arm, alternating between left and

[2] Method developed by Carroll E. Palmer, M. D., Director, Tuberculosis Research Office, World Health Organization.

[3] 1 T.U.=0.00002 mgm. reference standard PPD or 0.01 mgm. international standard O.T.

right. In the other arm one of the following doses was given if tested by team I: 1.25 T.U., 2.5 T.U., 5 T.U., 10 T.U., or if tested by team II: 5 T.U. Reactions on both arms were read at one time, one reader for each team. The 297 patients given 5 T.U. in both arms by team I and the 179 patients tested by team II were used for analysis.

*Study IV*, designed to determine the sensitivity level among tuberculosis patients,[4] was carried out at a tuberculosis hospital in Copenhagen. Of the 245 patients tested with 1 T.U., there were 118 women and 127 men ranging in age from 14 to 76 years. The readings were made by 2 readers independently and in a sample (104 patients) the reactions were read twice by both readers.

*Study V*, a large-scale series of projects, still in progress among school children in rural Denmark, is concerned with variations in vaccines as reflected by post-vaccination allergy. At the time of the 9-week retesting of project IV [5] with 5 T.U., two readers frequently were available to read the reactions independently. Material from 2 such occasions is used in this paper, group A comprising 182 children and group B, 191.

*Study VI*, conducted in Mexico, was made by a special research team using 2 different vaccines and retesting after 10 weeks with 10 T.U. On 1 day of the retesting among 253 school children, tuberculin reactions were read by 2 readers.

A summary is given in table 1 of the material used from the six studies described above showing, for each study, the number of observations, mean size of induration, and standard deviation of the distribution of reactions read by each reader.

## Results

Starting with the observations made by reader I in study I, where the reactions on the left and right arms were read separately, a correlation of reactions according to size of induration is shown in table 2. The size of reactions on the left arm is indicated by the horizontal scale, on the right arm by the vertical scale. Reactions which are of the same size on both arms are located along a diagonal line drawn from the upper left-hand corner to the lower right. Spread of observations on either side of this line expresses variations due to experimental error.

If the size of induration on the right arm of each individual is subtracted from the size of induration on his left arm, the differences for the 114 persons will be distributed as shown below:

[4] Edwards, Phyllis, and Guld, Johs.: Tuberculin sensitivity: A study of 245 tuberculous patients. Acta tuberc. Scandinav. (In press).

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Table 1. *Basic data of 6 studies used for investigation of experimental errors in tuberculin reactions with Mantoux tests*

| Study No. | Number tested | Reader | First reading: Left arm: Mean induration in mm. | First reading: Left arm: Standard deviation | First reading: Right arm: Mean induration in mm. | First reading: Right arm: Standard deviation | Number tested | Second reading: Left arm: Mean induration in mm. | Second reading: Left arm: Standard deviation |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 114<br>114 | I<br>II | 10.2<br>9.8 | 5.8<br>6.1 | 10.1<br>9.0 | 5.5<br>5.5 | 114<br>114 | 10.6<br>9.3 | 5.9<br>5.4 |
| 2 | 124<br>99 | I<br>II | 7.5<br>7.4 | 5.2<br>5.5 | 7.2<br>7.4 | 5.1<br>5.4 | | | |
| 3 | [1] 297<br>[2] 179 | I<br>I | 11.8<br>10.5 | 6.0<br>6.3 | 11.1<br>9.9 | 5.3<br>6.1 | | | |
| 4 | 245<br>245 | I<br>II | 13.2<br>12.4 | 4.2<br>3.6 | | | 104<br>104 | 13.7<br>11.9 | 3.4<br>3.3 |
| 5a | 182<br>182 | I<br>II | 11.3<br>11.5 | 4.7<br>5.0 | | | | | |
| 5b | 191<br>191 | I<br>II | 12.4<br>11.4 | 4.9<br>4.8 | | | | | |
| 6 | 253<br>253 | I<br>II | 14.8<br>11.9 | 5.5<br>4.4 | | | | | |

[1] Team I.
[2] Team II.

NOTE: For the empty boxes no observations have been made.

Difference in size of induration in mm.

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| −8 | −7 | −6 | −5 | −4 | −3 | −2 | −1 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |

Number of persons

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0 | 1 | 1 | 1 | 9 | 9 | 19 | 29 | 18 | 9 | 7 | 7 | 2 | 0 | 0 | 1 |

This distribution has a mean of 0.1, which is close to zero, as would be expected. The variance of this distribution is $S_D^2=5.47$. The variance of the experimental error will be half of 5.47, i. e., $S_E^2=2.74$, because each difference is composed of errors made in two tests. The standard error of an observed value of a reaction will be the square root of 2.74, $S_E=\sqrt{2.74}=1.65$.

Similar analyses were made for all the data used for this investigation and the results are presented in summary form in the tables that follow.

Table 3 concerns those studies where each individual received two tests with the same dose of tuberculin. It shows the mean difference in size of induration between reactions on left and right arms, the variance of the distribution of these differences, and estimated standard deviation for the total experimental error. It will be noted that the latter varies between 1.65 mm. and 2.27 mm.; the largest figure was obtained from testing of unruly and bedridden mental patients.

Table 2. *Distribution by size of induration in right arm and left arm, 114 persons, study I, reader I*

Mm. of induration on left arm

| Mm. of induration on right arm | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 2 | 1 | --- | 1 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 4 |
| 1 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 2 | 1 | --- | 2 | 1 | 1 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 5 |
| 3 | --- | --- | 2 | 2 | 1 | 1 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 6 |
| 4 | --- | --- | 1 | --- | --- | 2 | 1 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 4 |
| 5 | --- | --- | --- | 1 | 3 | 4 | --- | --- | 2 | --- | 1 | --- | --- | 1 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 12 |
| 6 | --- | --- | --- | 1 | --- | 1 | 1 | --- | 1 | --- | 1 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 5 |
| 7 | --- | --- | --- | --- | --- | --- | 2 | --- | 1 | 1 | --- | 1 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 5 |
| 8 | --- | --- | 1 | --- | --- | 1 | --- | --- | 1 | 1 | --- | --- | 1 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 5 |
| 9 | --- | --- | --- | --- | 1 | --- | 2 | --- | 2 | 1 | 2 | 1 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 9 |
| 10 | --- | --- | --- | --- | --- | --- | --- | 1 | 1 | --- | 2 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 4 |
| 11 | --- | --- | --- | --- | --- | --- | --- | --- | 1 | --- | 1 | 1 | 1 | 2 | 2 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 8 |
| 12 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 2 | 1 | 2 | 2 | 1 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 8 |
| 13 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 1 | --- | 3 | 3 | 1 | --- | --- | 1 | --- | --- | --- | --- | --- | --- | --- | 9 |
| 14 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 1 | 1 | 1 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 3 |
| 15 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 1 | --- | --- | 1 | 1 | 1 | --- | 1 | 1 | --- | --- | --- | --- | --- | 6 |
| 16 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 1 | --- | --- | 1 | --- | --- | --- | --- | 2 |
| 17 | --- | --- | --- | --- | --- | --- | --- | --- | --- | 1 | --- | --- | --- | --- | --- | --- | --- | 1 | 1 | --- | --- | --- | 1 | --- | --- | 4 |
| 18 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 1 | --- | --- | 4 | 2 | --- | --- | 1 | --- | --- | 8 |
| 19 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 1 | 1 | 1 | --- | --- | --- | 1 | --- | --- | 4 |
| 20 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 1 | --- | --- | --- | --- | --- | --- | 1 |
| 21 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 22 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 1 | --- | --- | --- | 1 |
| 23 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 24 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 1 | 1 |
| Total | 3 | 1 | 6 | 6 | 6 | 9 | 6 | 1 | 9 | 4 | 10 | 5 | 8 | 9 | 6 | 2 | 2 | 4 | 8 | 3 | 1 | 1 | 3 | --- | 1 | 114 |

Table 3. *Analysis of differences for studies where duplicate tests have been performed on the 2 arms (left arm minus right arm)*

| Study No. | Number tested | Reader | Mean differences in mm. | $S_D^2$ | $\sqrt{1/2\,S_D^2}$ |
|---|---|---|---|---|---|
| 1 | 114 | I | 0.1 | 5.47 | 1.65 |
| | 114 | II | 0.8 | 6.29 | 1.78 |
| 2 | 99 | I | 0.4 | 8.99 | 2.12 |
| | 99 | II | 0.0 | 8.26 | 2.03 |
| 3 | [1] 297 | I | 0.7 | 7.83 | 1.98 |
| | [2] 179 | I | 0.6 | 10.28 | 2.27 |

[1] Team I.
[2] Team II.

In a corresponding way, table 4 concerns studies where reactions were read twice by the same reader. The estimated standard deviation for the reading error varies between 1.09 mm. and 1.43 mm. These figures are in general smaller than those on the preceding table as they pertain only to the reading error since the errors in giving tests are not involved in duplicate readings.

Table 5 concerns studies in which a number of reactions have been read once by each of two persons. The difference between their results and the variance of the distribution of the differences have been computed as on preceding tables. In this case, the variance is equal to the sum of the reading variance for each reader, and it is not possible

Table 4. *Analysis of differences for studies where duplicate readings of the same reaction have been made by the same reader (first reading minus second reading)*

| Study No. | Number tested | Reader | Mean differences in mm. | $S_D^2$ | $\sqrt{1/2\, S_D^2}$ |
|---|---|---|---|---|---|
| 1 | 114<br>114 | I<br>II | −0.4<br>+0.5 | 3.68<br>4.12 | 1.36<br>1.43 |
| 4 | 104<br>104 | I<br>II | −0.5<br>+0.3 | 3.38<br>2.38 | 1.30<br>1.09 |

to determine what proportion of the total variance belongs to each reader. In order to calculate the standard deviation of the reading error, the assumption has been made that the reading variance is the same for both readers.

Table 5. *Analysis of differences for studies where the same reactions have been read by two readers (reader I minus reader II)*

| Study No. | Number tested | Arm | Mean differences in mm. | $S_D^2$ | $\sqrt{1/2\, S_D^2}$ |
|---|---|---|---|---|---|
| 1 | 114<br>114 | Left<br>Right | 0.4<br>1.1 | 5.45<br>5.32 | 1.65<br>1.63 |
| 2 | 99<br>99 | Left<br>Right | 0.6<br>0.1 | 4.43<br>2.63 | 1.49<br>1.15 |
| 4 | 245 | Left | 0.8 | 4.47 | 1.50 |
| 5a | 182 | Left | −0.2 | 3.24 | 1.27 |
| 5b | 191 | Left | 1.0 | 2.66 | 1.15 |
| 6 | 253 | Left | 2.9 | 4.97 | 1.58 |

From two of the studies where duplicate tests as well as duplicate readings are available, it is possible to obtain some idea of the relative amount of the total error attributable to each of its two components: giving of tests and reading of tests. In study I, about two-thirds of the variance of the total error is due to reading errors. In study II, however, reading errors account for scarcely half of the variance of the total error.

If the materials in these studies are grouped by dose of tuberculin (5 and 10 T.U. used in study I), by type of reaction (I–IV), and source of the allergy (from BCG or natural infection), no significant variation in the total error and reading error can be demonstrated.

The observed size of reactions to Mantoux 1–10 T.U. thus appears to have a standard error of roughly 2 mm. This figure was computed from all reactions, large and small, in each of the six studies, and represents a very general result which must be qualified. It is not possible from this material to determine whether this standard error of 2 mm. applies equally at all levels of sensitivity.

It clearly cannot apply to very small reactions because negative

deviations cannot possibly be of the same size as positive deviations the closer the true value of the reaction comes to zero. At these lower levels, the distribution of errors will, therefore, be skewed. It is reasonable to assume that a reaction somewhere near the middle of the total range should have a fairly normal distribution of errors. Under this assumption if the true value of a reaction is 10 mm., there would be a 95 percent chance that the observed value would be between 6–14 mm.; 5 out of 100 would be either above 14 mm. or below 6 mm. In very practical terms this means that if the lowest level for a positive reaction is at 6 mm., essentially all reactions whose true value is 10 mm. would be called positive. It would be desirable to know whether such limits could also be applied to reactions at a lower sensitivity level, particularly around the 5–6 mm. level where the border line is commonly placed between positive and negative. Unfortunately, it is not possible to say from this material what the standard error at this level may be, as it becomes progressively less certain as reactions approach zero.

Another method of analysis may be used, however, to obtain pertinent information concerning how often experimental errors may cause a reaction apparently to change from negative to positive or vice versa. Table 6 is designed to illustrate the frequency of such changes. The material from all studies in which two tests with the same dose of tuberculin were given has been grouped according to size of induration on the left arm. For each of these groups the distribution is shown by size of induration on the right arm.

**Table 6.** *Analysis of duplicate Mantoux tests grouped by size of induration on left arm and distributed by size of induration on right arm, 714 persons*

| Mm. induration to test on left arm | Number tested | Distribution by size of induration to test on right arm | | | | |
|---|---|---|---|---|---|---|
| | | 0–2 mm. | 3–5 mm. | 6–8 mm. | 9–11 mm. | 12 mm. and over |
| 0 | 53 | 46 | 7 | 0 | 0 | 0 |
| 1 | 6 | 3 | 3 | 0 | 0 | 0 |
| 2 | 25 | 12 | 12 | 1 | 0 | 0 |
| 3 | 30 | 8 | 17 | 4 | 1 | 0 |
| 4 | 34 | 6 | 23 | 4 | 1 | 0 |
| 5 | 32 | 3 | 21 | 6 | 2 | 0 |
| Total 0–5 mm. | 180 | 78 | 83 | 15 | 4 | 0 |
| Percentage | 100 | 43.4 | 46.1 | 8.3 | 2.2 | 0 |
| 6 | 27 | 0 | 7 | 13 | 5 | 2 |
| 7 | 21 | 1 | 2 | 12 | 5 | 1 |
| 8 | 37 | 0 | 6 | 20 | 8 | 3 |
| 9 | 32 | 0 | 3 | 11 | 12 | 6 |
| Total 6–9 mm. | 117 | 1 | 18 | 56 | 30 | 12 |
| Percentage | 100 | 0.8 | 15.4 | 47.9 | 25.6 | 10.3 |
| 10–14 | 227 | 1 | 5 | 20 | 96 | 105 |
| 15–19 | 146 | 0 | 2 | 2 | 12 | 130 |
| 20 mm. and over | 44 | 0 | 0 | 1 | 1 | 42 |
| Total 10 mm. and over | 417 | 1 | 7 | 23 | 109 | 277 |
| Percentage | 100 | 0.2 | 1.7 | 5.5 | 26.2 | 66.4 |

If 6 mm. is arbitrarily taken as the lower limit for a positive reaction, it will be noted that of 180 persons whose first test was negative, 10.5 percent would be called positive on the second test. This change in classification occurred essentially among persons whose response to the first test was 3–5 mm. of induration.

Conversely, of 117 persons showing 6–9 mm. of induration at the first test, i. e., positive to usual criteria, 16.2 percent would be negative to the other test. Of 417 persons with strong positive reactions (10 or more mm.) to the first test, 1.9 percent would be called negative to the second test.

It may be pertinent to point out that differences of such a degree have been shown in these research studies where duplicate tests were given by the same tester with careful attention to uniform technique and read by the same experienced reader. Greater differences due to experimental error must be expected when repeated tests are performed by different individuals in routine examinations.

## Summary


1. The paper reports the results of an investigation on the measurement of experimental error in giving and reading Mantoux tests.

2. Duplicate tests with 0.00002 mg., 0.0001 mg. or 0.0002 mg. PPD, and/or duplicate readings of the same reactions were made in 100–300 persons in each of six different studies carried out by the Tuberculosis Research Office, May–November 1950.

3. The total experimental error of an observed size of induration, composed of errors made in giving and reading tests, has a standard deviation of roughly 2 mm.; the reading error alone is about 1.3 mm.

4. In low levels of tuberculin sensitivity where the distribution of errors cannot be considered normal, the estimate of the standard deviation of the total experimental error does not apply.

5. Data are presented to show how frequently experimental errors can cause a reaction to appear to change from negative to positive and vice versa. Using 6 mm. of induration as the border line, positive reactions on the right arm were recorded in 10.5 percent of the persons who had negative reactions on the left arm, essentially among those with 3–5 mm. of induration. Conversely, 16.2 percent of the weak positive reactors, those with 6–9 mm. of induration on the left arm, had a negative reaction on the right arm. Of the strong positive reactors—more than 10 mm. of induration—1.9 percent were negative on the second test.

# Atabrine Therapy of Histoplasma Infections in Mice

By Charlotte C. Campbell and Samuel Saslaw, M.D.*

The specific agents now generally available for the therapy of bacterial and rickettsial infections have not been effective in diseases of mycotic origin other than nocardiosis and actinomycosis. The search therefore continues for nontoxic drugs which may be effective in the treatment of such diseases as coccidioidomycosis, histoplasmosis, cryptococcosis, blastomycosis, and other potentially systemic mycoses.

Bockman (*1*) has reported that atabrine (quinacrine hydrochloride) in concentrations of 25 to 50 mg. percent is fungicidal for *Cryptococcus neoformans in vitro*, but concludes that the high concentrations which are required for fungicidal action rule out *in vivo* study. Since the work done at this laboratory with several strains of *Histoplasma capsulatum* appeared to confirm the fact that relatively high concentrations of the drug are necessary for growth inhibition, it was felt that the drug's *in vitro* degree of activity against histoplasma organisms was insufficient to promise effectiveness *in vivo*.

Parmer (*2*), however, has demonstrated that, 4 hours after intramuscular administration of atabrine in rabbits, the spleens, livers, rib marrow, and lymph nodes of these animals yielded much higher concentrations of the drug than did plasma. Since these macrophage-rich tissues are typically involved in human histoplasmosis, the potentialities of atabrine as a therapeutic agent for the disease were deemed worthy of investigation. Studies were therefore undertaken to determine the effects of atabrine therapy on the mortality rates of mice experimentally infected with histoplasma organisms.

## Preliminary Studies

### *In Vitro Experiments*

In order to determine the effects of atabrine on the growth of *H. capsulatum*, preliminary experiments were performed in Mycophil [1] broth containing the following respective concentrations of the drug: 0.075, 0.15, 0.30, 0.60, and 0.75 mg. per ml. The broth was dispensed to tubes in 10 ml. quantities and inoculated with 0.1 ml. suspensions of 5-day-old cultures, after which the tubes were incubated for 60 days at 28° C. Inoculated broth which contained no atabrine was used

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[1] Baltimore Biological Laboratories.

as a growth control. The contents of all the tubes were subcultured in broth without atabrine at weekly intervals.

Three strains of *H. capsulatum* were used in these studies. Growth occurred in the control tube which contained no atabrine and in the one containing 0.075 mg. per ml., but none was apparent in the tubes containing higher concentrations of the drug. Subcultures from the 0.15 and 0.30 mg. per ml. concentrations were consistently negative over the 8-week period of incubation.

### *Toxicity Tests*

Groups of 10 mice each were given daily intraperitoneal injections of 0.5 ml. aqueous solutions of atabrine for 30 consecutive days. Daily dosages for the respective groups amounted to 0.075, 0.15, 0.30, 0.60, 0.75, and 0.90 mg. There were no deaths among the mice receiving 0.75 mg. of the drug for the 30-day test period. At the end of this period, however, 40 percent of the test mice receiving the 0.90 mg. dosage had succumbed.

## Therapeutic Studies

Young, white Swiss mice (Bagg strain), weighing 14 to 17 gm. were used throughout these studies. In each experiment, the animals were divided at random into groups of five, and each group was placed in an individual jar. Infections were induced by the intraperitoneal injection of approximately 3.5 million yeast-phase organisms (strain G–8) [2] suspended in 0.5 ml. of 5 percent hog gastric mucin, as described previously by the authors (*3*).

Among the animals in the treatment groups, atabrine therapy was begun on the day of infection. Daily injections of the drug were given intraperitoneally for 30 days. In one group of experiments, however, atabrine therapy was delayed for 1 week following infection. All drug dosages were delivered in 0.5 ml. sterile, distilled water.

Animals serving as drug controls in each experiment received 30 injections of the highest concentration of atabrine used in the experiment. Those serving as organism, or infected, controls received only a single challenge inoculum suspended in 0.5 ml. of mucin. A representative number (2 of each group of 5) of the infected animals that died during the course of the experiments, as well as of those surviving at the end of the studies, were necropsied and their spleens cultured for *H. capsulatum*.

### *Dosage Level Experiments*

These experiments were conducted for two purposes: (1) to determine whether the mortality rates of infected mice could be reduced

[2] A human isolate identified at this institution.

by the daily parenteral administration of atabrine, and (2) to establish the drug level at which such a reduction could be demonstrated. Of a total of 215 mice infected, five groups of 35 were given daily atabrine dosages of 0.075, 0.15, 0.30, 0.60, and 0.75 mg., respectively, for a period of 30 days. (These amounts, selected on the basis of the preliminary studies, approximated 5, 10, 20, 40, and 50 mg. per kg. of body weight, respectively.) The remaining 40 mice received no atabrine and served as organism controls.

Table 1 compares the results obtained at each atabrine dosage level in treated animals with those obtained among the untreated controls. Since the majority of deaths occurred during the second and third weeks following infection, the relatively few deaths within the first 3 days after inoculation were attributed to nonspecific causes and were not included in the statistical evaluations. In treated mice receiving the three smaller drug dosages, the respective death rates were 24 out of 35 (68.6 percent), 26 out of 34 (76.5 percent), and 26 out of 35 (74.3 percent). None of these rates differs appreciably from the rate among the untreated controls (26 out of 39, or 66.7 percent).

Table 1. *Comparative mortality among mice receiving atabrine and those receiving no atabrine following infection with* H. capsulatum *(atabrine dosages of 0.075–0.75 mg.)*

| Experimental subjects | Daily atabrine dosage (mg.) | Number dead/number observed | | | | Death rates (percent) | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | After 7 days | After 14 days | After 21 days | After 30 days | After 7 days | After 14 days | After 21 days | After 30 days |
| Infected animals (dosage approximately 3.5 million yeast-phase *H. capsulatum* organisms suspended in 0.5 ml. of 5 percent hog gastric mucin). | [1]None | 2/39 | 15/39 | 24/39 | 26/39 | 5.1 | 38.5 | 61.5 | 66.7 |
| | 0.075 | 2/35 | 19/35 | 23/35 | 24/35 | 5.7 | 54.3 | 65.7 | 68.6 |
| | .15 | 4/34 | 15/34 | 24/34 | 26/34 | 11.8 | 44.1 | 70.6 | 76.5 |
| | .30 | 0/35 | 12/35 | 25/35 | 26/35 | 0 | 34.3 | 71.4 | 74.3 |
| | .60 | 0/33 | 2/33 | 7/33 | 14/33 | 0 | 6.1 | 21.2 | 42.4 |
| | .75 | 0/32 | 3/32 | 8/32 | 9/32 | 0 | 9.4 | 25.0 | 28.1 |
| Drug controls [2] | .75 | 0/10 | 0/10 | 0/10 | 0/10 | 0 | 0 | 0 | 0 |

[1] Infected controls.
[2] Uninfected animals. Received atabrine only.

However, lower mortality rates were observed in the groups receiving atabrine dosages of 0.60 mg. and 0.75 mg., respectively. In the former, the death rate was 42.4 percent (14 deaths among 33 animals), while in the latter, it was only 28.1 percent (9 deaths among 32 animals). At necropsy, no gross lesions were observed in either the treated or untreated animals, but *H. capsulatum* was consistently isolated from the spleens of mice in both groups.

While there were no deaths among the drug-control animals receiving daily atabrine injections of 0.75 mg. during both the preliminary and the therapeutic studies, there were indications (such as failure to grow or gain weight) to suggest that this dosage approached the level of maximum tolerance. In subsequent studies, therefore, atabrine dosages in excess of 0.60 mg. were excluded.

In an effort to determine the variations which could be expected in biologic studies of this type, five separate additional studies were conducted in which the preceding experiments were repeated in modified form. Freshly prepared suspensions of the organism in mucin and atabrine dosage schedules of 0.30 and 0.60 mg. were employed in each experiment.

The results of the five separate studies, which were conducted at monthly intervals, are shown in table 2. The combined death rate for the untreated control groups was 74.4 percent (145 out of 195), which is significantly greater than the rates of 58.0 percent (83 out of 143), and 41.1 percent (58 out of 141), for the groups receiving 0.30 and 0.60 mg. of atabrine, respectively. As in the preceding experiments, the peak of mortality occurred during the second and third weeks following infection, and relatively few animals died during the fourth week. No mice in either the treated or untreated groups died after the thirtieth day. Again, necropsy of infected animals revealed no gross lesions, but positive cultures were obtained from the spleens of both treated and untreated animals.

Table 2. *Comparative mortality among mice receiving atabrine and those receiving no atabrine following infection with* H. capsulatum *(atabrine dosages of 0.3 and 0.6 mg.); results of 5 separate experiments*

| Experimental subjects | Daily atabrine dosage (mg.) | Experiment 1 | Experiment 2 | Experiment 3 | Experiment 4 | Experiment 5 | All experiments |
|---|---|---|---|---|---|---|---|
| | | Number dead/number observed [1] | | | | | |
| Infected animals (dosage approximately 3.5 million yeast-phase *H. capsulatum* organisms suspended in 0.5 ml. of 5 percent hog gastric mucin) | [2] None | 26/39 | 34/40 | 28/37 | 26/39 | 31/40 | 145/195 |
| | 0.30 | 26/35 | 11/20 | 14/20 | 5/19 | 27/49 | 83/143 |
| | .60 | 14/34 | 11/20 | 8/18 | 7/20 | 18/50 | 58/141 |
| Drug controls [3] | .60 | 0/10 | 0/10 | 0/10 | 0/10 | 0/10 | 0/50 |
| | | Death rates (percent) [1] | | | | | |
| Infected animals (dosage approximately 3.5 million yeast-phase *H. capsulatum* organisms suspended in 0.5 ml. of 5 percent hog gastric mucin) | [2] None | 66.6 | 85.0 | 75.7 | 66.6 | 77.5 | 74.4 |
| | 0.30 | 74.3 | 55.0 | 70.0 | 26.3 | 55.1 | 58.0 |
| | .60 | 41.1 | 55.0 | 44.4 | 35.0 | 36.0 | 41.1 |
| Drug controls [3] | .60 | 0 | 0 | 0 | 0 | 0 | 0 |

[1] 30 days after infection.
[2] Infected controls.
[3] Uninfected animals. Received atabrine only.

### *Delayed Treatment Experiments*

In order to determine the effect of atabrine on well-established histoplasma infections, 100 mice were infected with *H. capsulatum*, and treatment was not initiated until 7 days later when the animals appeared to be very ill. At that time, daily injections of 0.60 mg. of atabrine were begun in 50 of the mice.

As indicated in table 3, 43 of the 50 treated mice (86.0 percent) died, as compared with 39 of 48 untreated controls (81.3 percent). Thus, the mortality rate of mice with established infections did not appear to be altered by atabrine treatment.

Table 3. *Comparative mortality among mice receiving delayed atabrine therapy and those receiving no therapy following infection with* H. capsulatum *(daily atabrine dosage of 0.60 mg. begun 7 days following infection)*

| Experimental subjects | Daily atabrine dosage (mg.) | Number dead/number observed | | | | Death rates (percent) | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | After 7 days | After 14 days | After 21 days | After 30 days | After 7 days | After 14 days | After 21 days | After 30 days |
| Infected animals (dosage approximately 3.5 million yeast-phase *H. capsulatum* organisms suspended in 0.5 ml. of 5 percent hog gastric mucin). | [1] None | 1/48 | 28/48 | 33/48 | 39/48 | 2.1 | 58.3 | 68.7 | 81.3 |
| | 0.60 | 1/50 | 29/50 | 38/50 | 43/50 | 2.0 | 58.0 | 76.0 | 86.0 |
| Drug controls [2] | .60 | 0/10 | 0/10 | 0/10 | 0/10 | 0 | 0 | 0 | 0 |

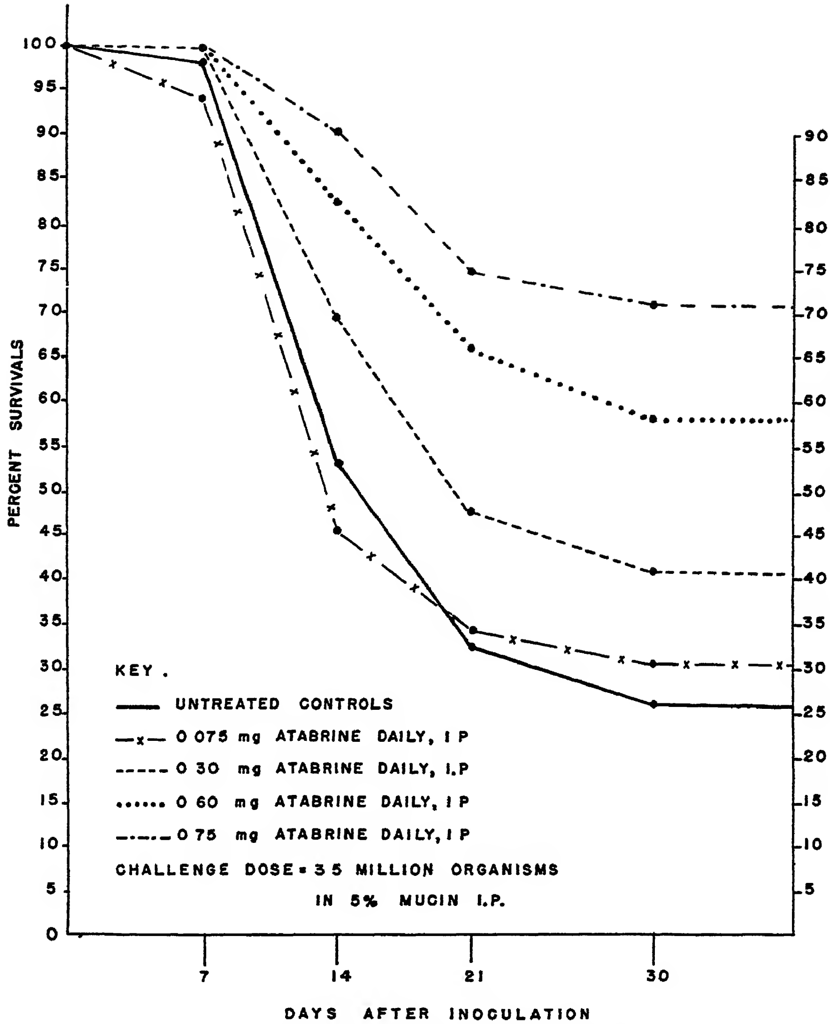
[1] Infected controls.
[2] Uninfected animals. Received atabrine only.

## Discussion

The studies described in this report indicate that the mortality rates of mice experimentally infected with *H. capsulatum* are reduced significantly following daily intraperitoneal injections of atabrine begun at the time of infection. Moreover, survival rates appear to increase with increasing dosages of the drug up to and including the dosage level of 0.75 mg. per day (approximately 50 mg. per kg. of body weight). This parallelism is demonstrated graphically in the chart.

As noted, viable histoplasma organisms were consistently recovered from all treated survivors, regardless of the atabrine dosage level employed. This would appear to suggest that the drug exerts a suppressive rather than a lethal effect on *H. capsulatum in vivo*, and may account in part for the failure of the drug to reduce mortality rates among mice included in the delayed treatment studies. Since massive doses of the organism were suspended in a virulence "enhancing" menstruum and introduced by an artificial route to induce mortality in excess of 50 percent in untreated animals, it is possible that the infectious process was too firmly established to respond to atabrine when therapy was begun. This type of infection may be comparable to widely disseminated histoplasmosis in man, and since the macrophage tissues are heavily parasitized in such advanced infections, it probably would be most difficult to demonstrate the effectiveness of any therapeutic agent.

On the other hand, the possibility that atabrine may be of value in the therapy of less overwhelming infections is encouraged by




**Effect of increasing doses of atabrine on survival rate of mice infected with *H. capsulatum*.**

Parmer's (*2*) observation that high concentrations of atabrine are deposited in the reticulo-endothelial tissue, which *H. capsulatum* so readily involves. Four hours after rabbits had received intramuscular injections of 8 mg. of atabrine per kg. of body weight, Parmer found that 40.62, 7.78, 5.08, and 3.70 mg. per kg., respectively, could be recovered from the spleen, liver, rib marrow, and lymph nodes. Plasma levels, however, were only 0.08 mg. per kg. of body weight.

In further experiments with patients, moreover, Parmer found that bone-marrow concentrations were as high as 20 times those of plasma.

In the present studies, the effective atabrine dosage for experimental mouse infections corresponded to 40 mg. per kg. of body weight,

which, on an equivalent weight basis, would suggest a daily dosage for humans of 2.8 gm. for an average 70 kg. individual. Obviously, this would be a toxic regimen, but it is possible that the differences between experimental histoplasma infections in mice and spontaneous infections in humans may permit the use of lower atabrine dosages in the latter. Moreover, it is also possible that the successful suppression of histoplasma infections may be influenced by the early administration of the drug before widespread involvement of tissue has occurred, as is the case in plasmodial infections.

Because proved cases of human histoplasmosis do recover spontaneously (4–7), and, furthermore, because of the disease's diversity of symptoms and its severity in man, the ultimate evaluation of any therapeutic agent for the disease will be quite difficult to accomplish. Nevertheless, since no other nontoxic agents for the treatment of this disease exist, the findings reported in this paper would suggest that atabrine be given clinical trial in human histoplasma infections.

One further observation should be noted regarding the studies reported in this paper. During the experiments, the authors received the impression that male mice were more susceptible than females to histoplasma infection. Available data were therefore segregated according to sex, and the resulting summary (table 4) showed an over-all mortality rate for both treated and untreated males which was 26.1 percent higher than that for females. In the untreated control groups alone, deaths among males totaled 49 out of 58 (84.5 percent), as against 34 out of 60 (56.7 percent) among females. Moreover, in the groups receiving atabrine dosages varying from 0.075 to 0.60 mg., male deaths totaled 93 out of 149 (62.4 percent), whereas the female deaths amounted to only 65 out of 149 (43.6 percent). These differences are significant and suggest that the sex of animals should be considered in evaluating studies of this nature.

Table 4. *Comparative mortality, by sex, among mice receiving atabrine and those receiving no atabrine following infection with* H. capsulatum

| Experimental subjects | Daily atabrine dosage (mg.) | Number dead/number observed | | Death rates (percent) | |
|---|---|---|---|---|---|
| | | Males | Females | Males | Females |
| Infected animals (dosage approximately 3.5 million yeast-phase *H. capsulatum* organisms suspended in 0.5 ml. of 5 percent hog gastric mucin. | None | 49/58 | 34/60 | 84.5 | 56.7 |
| | 0.075–0.60 | 93/149 | 65/149 | 62.4 | 43.6 |
| Totals | | 142/207 | 99/209 | 68.6 | 47.4 |

## Summary

1. Atabrine concentrations of 0.15 mg. per ml. inhibited the growth of *H. capsulatum in vitro.*

2. Mice experimentally infected with yeast-phase histoplasma organisms were given daily intraperitoneal injections of atabrine in dosages of 0.075, 0.15, 0.30, 0.60, and 0.75 mg., respectively, for 30 consecutive days. The animals treated with the daily dosage of of 0.60 mg. experienced a survival rate of 58.9 percent compared with 26.1 percent for untreated controls. The daily administration of 0.75 mg. of the drug resulted in a survival rate of 71.9 percent as against 33.3 percent for the control group. When therapy (0.60 mg. of atabrine) was withheld for 1 week following infection, mortality rates proved to be roughly the same for both treated and untreated animals. *H. capsulatum* was isolated from the spleens of both treated and untreated mice, indicating that the effect of atabrine is suppressive rather than lethal.

3. The results of these studies suggest the trial of atabrine in the therapy of human histoplasmosis.

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# Incidence of Disease

*No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring*

## UNITED STATES

### Reports From States for Week Ended April 14, 1951

*Influenza*

In collaboration with the Influenza Information Center, National Institutes of Health, the following report on influenza has been prepared.

The total number of influenza cases reported for the current week was 5,898, a 19-percent decrease from the 7,253 reported last week and a 12-percent decrease from the 6,737 cases reported for the corresponding week last year.

Dr. A. A. Jenkins, Utah State Department of Health, reports a total of 265 cases of influenza in Davis County (population 30,000) for the week ended March 9. Since that time, paired blood specimens have been examined by Dr. Glenn R. Leymaster, University of Utah College of Medicine. The diagnosis has been confirmed in three out of six serum specimens. The total number of reported cases in Utah for March was 538.

Dr. J. V. Irons of the Texas State Department of Health Laboratories, reports influenza A-prime virus isolated recently from two cases of influenza in Austin. Of nine cases clinically diagnosed as influenza, three have shown significant titer rises against influenza A and A-prime and two have shown significant titer rises only against influenza A-prime.

Dr. E. H. Lennette, Director of the Regional Laboratory at Berkeley, Calif., reports significant antibody rises in the complement fixation test against influenza A in 36 paired serum specimens tested from March 31 to April 13.

The laboratory at the National Institutes of Health reports an increase in titer for influenza A-prime in one paired serum specimen and for both A and A-prime in three paired sera obtained at a military installation in Virginia.

#### Epidemiological Reports

*Conjunctivitis*

Dr. D. S. Fleming, Minnesota Department of Health, reports an outbreak of 24 cases of acute conjunctivitis between February 7 and March 12 among 400 employees of a produce plant. Twenty-three of

the cases occurred among 90 employees eviscerating chickens. No cases were known in family or community contacts.

The conjunctivitis was limited to one eye with severe edema of the lids and considerable involvement of the ocular conjunctiva. The cornea was not involved. Recovery was usually complete in a week with no sequela. There were no constitutional symptoms. The condition did not cause any loss of time from employment. Bacteriological studies from swabs of the conjunctiva were not productive. Virus studies are being carried out at this time.

*Infectious Hepatitis*

Dr. W. J. Murphy, Director, Division of Epidemiology, Georgia Department of Public Health, reports six cases of infectious hepatitis among children at one school during February and March. The children ranged in ages from 6 to 13 years. No evidence suggested a common source of infection.

Dr. A. W. Freeman, Maryland State Department of Health, reports outbreaks of infectious jaundice. Twenty-seven cases have occurred in one State institution since January 1. Person-to-person spread is indicated but not a common origin. Another outbreak seemingly centered about public schools is now under investigation.

*Botulism*

Dr. W. L. Halverson, California Director of Public Health, telegraphed a report of one case of botulism diagnosed April 2, 3 days after the patient tasted home-canned string beans that appeared spoiled and musty in odor. The patient is expected to recover. After one bean was eaten, the remainder of the jar was thrown to chickens and ducks. Twenty to thirty of the fowl died of typical limberneck

*Food Poisoning*

The Food and Drug Officer, United States Food and Drug Administration, adds the following to the report last week of Dr. W. L. Halverson. Investigation of the food poisoning outbreak among 25 diners at a popular resort area restaurant occurred March 10 at Palm Springs, Calif. Apparently the item eaten in common was corned beef obtained from a Los Angeles sausage company. Specimens of the corned beef sent to the State laboratory at Berkeley showed a heavy growth of coagulase-positive staphylococcus organisms. One patient, a doctor, sent a specimen to a Chicago laboratory. All investigations have not yet been completed by State and other agencies concerned.

Dr. W. L. Halverson reported by telegraph, an outbreak of food poisoning involving eight cases in two families with suspected source reported as chicken sandwiches. No food was available for laboratory examination.

## *Comparative Data For Cases of Specified Reportable Diseases: United States*

[Numbers after diseases are International List numbers, 1948 revision]

| Disease | Total for week ended— | | 5-year median, 1946–50 | Seasonal low week | Cumulative total since seasonal low week | | 5-year median, 1945–46 through 1949–50 | Cumulative total for calendar year— | | 5-year median, 1946–50 |
|---|---|---|---|---|---|---|---|---|---|---|
| | Apr. 14, 1951 | Apr. 15, 1950 | | | 1950–51 | 1949–50 | | 1951 | 1950 | |
| Anthrax (062) | 1 | 1 | 1 | (1) | (1) | (1) | (1) | 23 | 9 | 15 |
| Diphtheria (055) | 60 | 107 | 127 | 27th | 4, 242 | 6, 504 | 9, 334 | 1, 335 | 2, 233 | 2, 976 |
| Encephalitis, acute infectious (082) | 20 | 21 | 7 | (1) | (1) | (1) | (1) | 222 | 199 | 119 |
| Influenza (480–483) | 5, 898 | 6, 737 | 1, 597 | 30th | 117, 891 | 132, 582 | 132, 582 | 103, 349 | 121, 998 | 121, 998 |
| Measles (085) | 23, 253 | 12, 248 | 25, 616 | 35th | 249, 154 | 138, 692 | 285, 679 | 220, 453 | 119, 562 | 250, 733 |
| Meningitis, meningococcal (057.0) | 138 | 104 | 104 | 37th | 2, 597 | 2, 356 | 2, 294 | 1, 636 | 1, 442 | 1, 322 |
| Pneumonia (490–493) | 1, 676 | 2, 348 | (2) | (1) | (1) | (1) | (1) | [3] 30,333 | 38, 638 | (2) |
| Poliomyelitis, acute (080) | 71 | 62 | 32 | 11th | 216 | 249 | 119 | 1, 428 | 1, 380 | 721 |
| Rocky Mountain spotted fever (104) | ------- | 1 | 3 | (1) | (1) | (1) | (1) | 4 | 16 | 13 |
| Scarlet fever (050) [4] | 2. 140 | 1, 513 | 2, 234 | 32d | 49, 903 | 42, 834 | 64, 215 | 34, 212 | 26, 395 | 40, 604 |
| Smallpox (084) | ------- | ------- | 2 | 35th | 13 | 39 | 58 | 5 | 18 | 37 |
| Tularemia (059) | 13 | 16 | 16 | (1) | (1) | (1) | (1) | 210 | 316 | 316 |
| Typhoid and paratyphoid fever (040, 041) [5] | 39 | 39 | 43 | 11th | 156 | 171 | 176 | 591 | 681 | 681 |
| Whooping cough (056) | 1, 454 | 2, 467 | 2, 149 | 39th | 44, 833 | 60, 221 | 60, 221 | 23, 231 | 38, 685 | 32, 906 |

[1] Not computed.
[2] Data not available.
[3] Addition: Florida, week ended Mar. 31, 39 cases.
[4] Including cases reported as streptococcal sore throat.
[5] Including cases reported as salmonellosis.

## Reported Cases of Selected Communicable Diseases: United States, Week Ended Apr. 14, 1951

[Numbers under diseases are International List numbers, 1948 revision]

| Area | Diphtheria (055) | Encephalitis, infectious (082) | Influenza (480–483) | Measles (085) | Meningitis, meningococcal (057.0) | Pneumonia (490–493) | Poliomyelitis (080) |
|---|---|---|---|---|---|---|---|
| **United States** | **60** | **20** | **5,898** | **23,253** | **138** | **1,676** | **71** |
| **New England** | **3** | **4** | **191** | **911** | **5** | **66** | **1** |
| Maine | - | - | 165 | 24 | 1 | 34 | - |
| New Hampshire | - | - | 9 | 26 | - | 4 | - |
| Vermont | - | - | - | 170 | - | - | - |
| Massachusetts | 3 | 4 | - | 435 | 2 | - | - |
| Rhode Island | - | - | 2 | 2 | - | 1 | - |
| Connecticut | - | - | 15 | 254 | 2 | 27 | 1 |
| **Middle Atlantic** | **7** | **6** | **495** | **3,114** | **19** | **233** | **3** |
| New York | 4 | 5 | [1] 473 | 1,071 | 10 | 65 | 1 |
| New Jersey | - | 1 | 22 | 591 | 1 | 74 | 1 |
| Pennsylvania | 3 | - | - | 1,452 | 8 | 94 | 1 |
| **East North Central** | **8** | **6** | **36** | **3,972** | **31** | **157** | **7** |
| Ohio | 4 | - | - | 1,479 | 16 | - | - |
| Indiana | 1 | 1 | 7 | 269 | 3 | 17 | - |
| Illinois | - | 2 | 20 | 460 | 6 | 87 | 3 |
| Michigan | 3 | 2 | 9 | 458 | 2 | 53 | 4 |
| Wisconsin | - | 1 | - | 1,306 | 4 | - | - |
| **West North Central** | **3** | **1** | **90** | **1,092** | **7** | **42** | **14** |
| Minnesota | 1 | - | 3 | 87 | 3 | 11 | 3 |
| Iowa | - | - | - | 92 | 2 | 2 | 5 |
| Missouri | 1 | - | 10 | 236 | 2 | 3 | - |
| North Dakota | 1 | 1 | 26 | 69 | - | 21 | - |
| South Dakota | - | - | 47 | 45 | - | 4 | 5 |
| Nebraksa | - | - | - | 39 | - | - | 1 |
| Kansas | - | - | 4 | 524 | - | 1 | - |
| **South Atlantic** | **18** | **1** | **2,359** | **1,786** | **20** | **219** | **10** |
| Delaware | - | - | 1 | 14 | - | - | - |
| Maryland | 3 | - | 16 | 110 | 2 | 36 | - |
| District of Columbia | - | - | - | 38 | 1 | 13 | - |
| Virginia | 5 | 1 | 717 | 776 | 3 | 70 | 1 |
| West Virginia | 1 | - | 1,142 | 158 | 2 | 19 | - |
| North Carolina | 3 | - | - | 140 | 9 | - | 2 |
| South Carolina | 3 | - | 92 | 103 | 1 | 54 | - |
| Georgia | - | - | 391 | 339 | 2 | 27 | 2 |
| Florida | 3 | - | - | 108 | - | - | 5 |
| **East South Central** | **7** | **1** | **325** | **838** | **13** | **162** | **8** |
| Kentucky | - | - | 120 | 504 | 5 | 7 | 3 |
| Tennessee | 5 | - | 158 | 99 | 5 | - | 1 |
| Alabama | 1 | - | - | 143 | 1 | 93 | 2 |
| Mississippi | 1 | 1 | 47 | 92 | 2 | 62 | 2 |
| **West South Central** | **11** | **1** | **1,309** | **5,271** | **27** | **622** | **11** |
| Arkansas | 1 | - | 1,173 | 335 | 3 | 103 | - |
| Louisiana | 1 | - | 7 | 58 | 3 | 74 | 2 |
| Oklahoma | 4 | - | 129 | 608 | 5 | 48 | 1 |
| Texas | 5 | 1 | - | 4,270 | 16 | 397 | 8 |
| **Mountain** | **1** | - | **854** | **1,643** | **4** | **90** | **7** |
| Montana | - | - | 40 | 38 | - | - | - |
| Idaho | - | - | - | 190 | 1 | - | - |
| Wyoming | - | - | 1 | 32 | - | 5 | - |
| Colorado | - | - | 43 | 467 | 1 | 25 | 6 |
| New Mexico | - | - | - | 40 | 1 | 19 | - |
| Arizona | 1 | - | 770 | 784 | 1 | 41 | 1 |
| Utah | - | - | - | 81 | - | - | - |
| Nevada | - | - | - | 11 | - | - | - |
| **Pacific** | **2** | - | **239** | **4,626** | **12** | **85** | **10** |
| Washington | - | - | 57 | 659 | 3 | - | - |
| Oregon | - | - | 91 | 815 | 2 | 29 | 1 |
| California | 2 | - | 91 | 3,152 | 7 | 56 | 9 |
| Alaska | - | - | 173 | - | 1 | - | - |
| Hawaii | - | - | 3 | 8 | - | - | - |

[1] New York City only.
*Anthrax*: Massachusetts, 1 case.

## Reported Cases of Selected Communicable Diseases: United States, Week Ended Apr. 14, 1951—Continued

[Numbers under diseases are International List numbers, 1948 revision]

| Area | Rocky Mountain spotted fever (104) | Scarlet fever (050) | Smallpox (084) | Tularemia (059) | Typhoid and paratyphoid fever[1] (040, 041) | Whooping cough (056) | Rabies in animals |
|---|---|---|---|---|---|---|---|
| **United States** | | **2,140** | | **13** | **39** | **1,454** | **163** |
| **New England** | | **188** | | | | **99** | |
| Maine | | 14 | | | | 18 | |
| New Hampshire | | [2] 7 | | | | 9 | |
| Vermont | | 7 | | | | 9 | |
| Massachusetts | | 129 | | | | 42 | |
| Rhode Island | | 3 | | | | 12 | |
| Connecticut | | 28 | | | | 9 | |
| **Middle Atlantic** | | **392** | | | **7** | **213** | **14** |
| New York | | [2] 222 | | | 4 | 88 | 10 |
| New Jersey | | 42 | | | | 72 | |
| Pennsylvania | | 128 | | | 3 | 53 | 4 |
| **East North Central** | | **733** | | | **2** | **184** | **38** |
| Ohio | | 236 | | | 1 | 46 | 8 |
| Indiana | | 68 | | | | 19 | 14 |
| Illinois | | 62 | | | 1 | 28 | 4 |
| Michigan | | 312 | | | | 59 | 11 |
| Wisconsin | | 55 | | | | 32 | 1 |
| **West North Central** | | **119** | | | | **64** | **14** |
| Minnesota | | 24 | | | | 2 | 3 |
| Iowa | | 13 | | | | 4 | 6 |
| Missouri | | 48 | | | | 12 | 3 |
| North Dakota | | | | | | 2 | |
| South Dakota | | 4 | | | | 4 | |
| Nebraska | | 4 | | | | 2 | 2 |
| Kansas | | 26 | | | | 38 | |
| **South Atlantic** | | **168** | | **4** | **4** | **316** | **20** |
| Delaware | | | | | | 1 | |
| Maryland | | 30 | | | 3 | 4 | |
| District of Columbia | | 10 | | | | 6 | |
| Virginia | | 16 | | | | 71 | 7 |
| West Virginia | | 24 | | | | 30 | 1 |
| North Carolina | | 62 | | | | 56 | |
| South Carolina | | 5 | | | | 17 | 4 |
| Georgia | | 4 | | 4 | 1 | 103 | 8 |
| Florida | | 17 | | | | 28 | |
| **East South Central** | | **85** | | **3** | **6** | **49** | **32** |
| Kentucky | | 35 | | | 1 | 7 | 12 |
| Tennessee | | 35 | | 3 | 1 | 8 | 10 |
| Alabama | | 9 | | | 4 | 27 | 9 |
| Mississippi | | 6 | | | | 7 | 1 |
| **West South Central** | | **48** | | **5** | **9** | **377** | **38** |
| Arkansas | | 3 | | | 1 | 48 | 1 |
| Louisiana | | 4 | | | 3 | 7 | |
| Oklahoma | | 11 | | 1 | | 22 | |
| Texas | | 30 | | 4 | 5 | 300 | 37 |
| **Mountain** | | **132** | | **1** | **7** | **101** | **3** |
| Montana | | 10 | | 1 | | 7 | 3 |
| Idaho | | 38 | | | 2 | 5 | |
| Wyoming | | | | | | 11 | |
| Colorado | | 13 | | | 2 | 17 | |
| New Mexico | | 1 | | | 1 | 7 | |
| Arizona | | 3 | | | 2 | 51 | |
| Utah | | [2] 67 | | | | 3 | |
| Nevada | | | | | | | |
| **Pacific** | | **275** | | | **4** | **51** | **4** |
| Washington | | 62 | | | | 5 | 1 |
| Oregon | | 23 | | | | 9 | |
| California | | [2] 190 | | | 4 | 37 | 3 |
| Alaska | | 1 | | | | | |
| Hawaii | | | | | | | |

[1] Including cases reported as salmonellosis.
[2] Including cases reported as streptococcal sore throat.

# FOREIGN REPORTS

## AUSTRALIA

*Encephalitis.* An outbreak of encephalitis, now called "Murray Valley encephalitis," has occurred in Murray Valley, in northwest Victoria. Prior to February 28, a total of 39 cases with 10 deaths had been observed. A virus, as yet unidentified, has been recovered by Dr. F. M. Burnet, who states that it is unlike the poliomyelitis or myxomatosis viruses. The latter is found in rabbits in that area. Dr. Burnet states that Murray Valley encephalitis appears to have an animal reservoir.

## CANADA

*Reported Cases of Certain Diseases—Week Ended March 31, 1951*

| Disease | Total | Newfoundland | Prince Edward Island | Nova Scotia | New Brunswick | Quebec | Ontario | Manitoba | Saskatchewan | Alberta | British Columbia |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Brucellosis | 2 | | | | | 1 | | 1 | | | |
| Chickenpox | 689 | 2 | | 17 | | 154 | 339 | 22 | 13 | 55 | 87 |
| Diphtheria | 4 | | | | | 3 | 1 | | | | |
| Dysentery, bacillary. | 7 | | | | | 4 | | | | | 3 |
| German measles | 358 | | | 102 | | 38 | 120 | | 4 | 34 | 60 |
| Influenza | 1,180 | | | 81 | 22 | | 140 | 81 | | | 856 |
| Measles | 1,050 | 3 | | 113 | 2 | 163 | 560 | 118 | 7 | 45 | 39 |
| Meningitis, meningococcal. | 6 | | | 1 | | | 4 | | | | 1 |
| Mumps | 759 | | | 10 | 1 | 186 | 239 | 33 | 63 | 103 | 124 |
| Scarlet fever | 241 | | | 1 | | 57 | 36 | 26 | 17 | 69 | 35 |
| Tuberculosis (all forms). | 187 | 1 | | 3 | 9 | 106 | 38 | 11 | 6 | 13 | |
| Typhoid and paratyphoid fever. | 7 | | | | 3 | 1 | 1 | | | | 2 |
| Venereal diseases: | | | | | | | | | | | |
| Gonorrhea | 239 | 2 | | 4 | 7 | 79 | 36 | 17 | 16 | 33 | 45 |
| Syphilis | 112 | 3 | | 7 | 1 | 60 | 15 | 5 | 8 | 3 | 10 |
| Primary | 6 | | | | | 2 | 1 | | 1 | 1 | 1 |
| Secondary | 10 | | | | | 4 | 4 | 1 | 1 | | |
| Other | 96 | 3 | | 7 | 1 | 54 | 10 | 4 | 6 | 2 | 9 |
| Whooping cough | 132 | 6 | | | | 36 | 51 | 5 | 6 | 20 | 8 |

## FINLAND

*Reported Cases of Certain Diseases—February 1951*

| Disease | Cases | Disease | Cases |
|---|---|---|---|
| Diphtheria | 47 | Typhoid fever | 7 |
| Meningitis, meningococcal | 9 | Venereal diseases: | |
| Paratyphoid fever | 31 | Gonorrhea | 366 |
| Poliomyelitis | 8 | Syphilis | 42 |
| Scarlet fever | 2,191 | | |

## NORWAY

*Reported Cases of Certain Diseases—January 1951*

| Disease | Cases | Disease | Cases |
|---|---|---|---|
| Brucellosis | 1 | Pneumonia (all forms) | 4,411 |
| Diphtheria | 17 | Poliomyelitis | 26 |
| Dysentery, unspecified | 1 | Rheumatic fever | 88 |
| Erysipelas | 306 | Scabies | 997 |
| Gastroenteritis | 2,090 | Scarlet fever | 90 |
| Hepatitis, infectious | 48 | Tuberculosis (all forms) | 287 |
| Impetigo contagiosa | 1,506 | Venereal diseases: | |
| Influenza | 10,831 | Gonorrhea | 179 |
| Malaria | 2 | Syphilis | 60 |
| Measles | 2,518 | Other forms | 2 |
| Meningitis, meningococcal | 12 | Weil's disease | 7 |
| Mumps | 60 | Whooping cough | 1,574 |

## REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

**The following reports include only items of unusual incidence or of special interest and the occurrence of these diseases, except yellow fever, in localities which had not recently reported cases. All reports of yellow fever are published currently. A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.**

### Cholera

*India (French).* During the week ended March 24, 1951, 28 cases of cholera were reported in Pondicherry as compared with 11 the previous week.

### Smallpox

*Burma.* For the week ended April 7, 1951, 14 cases of smallpox were reported in Moulmein and 6 cases were reported in Akyab.

*India.* During the week ended April 7, 1951, smallpox was reported in ports of India as follows: Calcutta, 498 cases; Madras, 133; Bombay, 49; and Masulipatnam, 14. For the week ended March 31, 181 cases were reported in the airport of Nagpur and 12 cases were reported in Ahmedabad.

*India (French).* During the week ended March 24, 1951, 191 cases of smallpox were reported in Pondicherry as compared with 293 for the previous week. For the week ended March 24, two cases were reported in Karikal.

*Indochina.* During the week ended April 7, 1951, 47 cases of smallpox were reported in Haiphong, Viet Nam, and 23 cases were reported in Hanoi. For the previous week these ports reported 29 and 15 cases, respectively.

### Typhus Fever

*Iran.* For the week ended March 31, 1951, typhus fever was reported in airports of Iran as follows: Zabol, 28 cases; Teheran, 2; and Zandjan, 2.

*Transjordan.* For the week ended March 31, 1951, 21 cases of typhus fever were reported in Transjordan as compared with 7 the previous week.

### Yellow Fever

*Brazil*. In connection with the recent outbreak of jungle yellow fever in Brazil one death each has been confirmed in Goias State on the following dates: December 23, 1950, January 5 and 14, February 1 and 9, and March 18, 1951. In Mato Grosso State one death was confirmed on January 18, 1951.

*Ecuador*. Eighteen cases of jungle fever were reported in Santo Domingo de los Colorados, which is about 80 miles west of Quito.

*Nigeria*. During the week ended March 23, 1951, one suspected case of yellow fever was reported in Sabon. This is a new focus for the disease. The patient died in a hospital in Ibadan on March 23.

+ + +

The printing of this publication has been approved by the Director of the Bureau of the Budget (August 10, 1949).

The PUBLIC HEALTH REPORTS, first published in 1878 under authority of an act of Congress of April 29 of that year, is issued weekly by the Public Health Service through the Division of Public Health Methods, pursuant to the following authority of law: United States Code, title 42, sections 241, 245, 247; title 44, section 220.

It contains (1) current information regarding the incidence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

The PUBLIC HEALTH REPORTS is published primarily for distribution, in accordance with the law, to health officers, members of boards or departments of health, and other persons directly or indirectly engaged in public health work. Articles of special interest are issued as reprints or as supplements, in which forms they are made available for more economical and general distribution.

Requests for and communications regarding the PUBLIC HEALTH REPORTS, reprints, or supplements should be addressed to the Surgeon General, Public Health Service, Washington 25, D. C. Subscribers should remit direct to the Superintendent of Documents, Washington 25, D. C.

Librarians and others should preserve their copies for binding, as the Public Health Service is unable to supply the general demand for bound copies. Indexes will be supplied upon request.

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# Public Health Reports

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FEDERAL SECURITY AGENCY

PUBLIC HEALTH SERVICE

FEDERAL SECURITY AGENCY

*Oscar R. Ewing, Administrator*

PUBLIC HEALTH SERVICE

*Leonard A. Scheele, Surgeon General*

Division of Public Health Methods

*G. St. J. Perrott, Chief of Division*

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# Public Health Reports

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## Physical Status of Men Examined Through Selective Service in World War II

By MARCUS S. GOLDSTEIN, Ph. D.*

Large numbers of young men are currently being called up by Selective Service for physical examinations, and again a general mobilization of manpower may become necessary in the national defense. The experiences of the last war with reference to rejections for physical or mental defects, specific causes for rejection, and related matters indicate what may be expected in another national emergency. A résumé of these findings may stimulate medical and public health measures commensurate with the needs and urgency of the time.

### Selective Service

*General Organization*

The Selective Training and Service Act became law September 6, 1940. National headquarters of the Selective Service System [1] in Washington was responsible for formulating policies, for transmitting to State offices the calls for men made by the armed forces, and for serving in general as a coordinating agency. State headquarters of Selective Service carried out the same general functions within each State. The burden of registration and classification of men for service in the armed forces rested with 6,443 local boards throughout the country. Each local board consisted of not less than three responsible citizens who represented a county or an area of approximately 30,000 population and were appointed by the Governor of each State.

*Medical Organization*

The purpose of medical examinations in Selective Service is best expressed in one of its own publications (*1*):

The medical program of the Selective Service System during World War II was based on the need for selection of mentally alert and physically fit men who could

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[1] The Selective Service System has published a comprehensive report, in three volumes, on Physical Examination of Selective Service Registrants (*1-3*) from which much of the present paper is derived.

make use of the tools of modern warfare . . . to assure final victory. Concomitant with this need was the obligation of all who controlled this selection to protect from the rigorous demands of military life men who might be able to live useful and normal civilian lives but whose physical or mental defects would almost inevitably make them liabilities to the armed services under conditions of military life. The fulfillment of this obligation, both to the armed forces and to the men whose health and efficiency depended on the decisions made in the selective process, devolved largely upon the medical organization of Selective Service.

One or more physicians were assigned to each State branch of Selective Service by the President upon recommendation of the Governor. These medical officers recommended physicians for appointment as examining physicians for local boards and as members of medical advisory boards. At least one examining physician was appointed to each local board. No physician could conduct the physical examination of a close relative or of anyone connected in a business capacity with the physician. The examining physician could not be a member of the local board itself.

Specialists were appointed to serve as members of medical advisory boards. These advisory boards were established in broad population areas to reexamine registrants whose physical fitness for military service seemed doubtful to the physicians of the local boards.

In the period, November 1940 to June 1946, a total of 44,120 physicians served at one time or another, without compensation, as examiners on local boards. Of 8,314 physicians appointed on or before November 18, 1940, 5,153, or 62 percent, were still serving on June 30, 1946.

On March 13, 1941, provision was made through Selective Service to add examining dentists to the medical personnel of each local board, much in the same manner as that for examining physicians.

*The Physical Examination*

Between November 1940 and December 1941, the peacetime period of Selective Service, the examining physicians of the local boards were instructed to make a complete physical examination of each registrant referred for examination and to record all defects, minor as well as those which were disqualifying. At the end of the physical examination and after the results of serological tests for syphilis were ascertained, the examining physician or medical advisory board chairman advised the local board whether the registrant was qualified for general or limited military service, respectively, or was disqualified for any form of service under the current physical standards set by the Army. Registrants forwarded for induction were reexamined by Army medical boards comprising Army reserve medical officers and civilian physicians. The final decision as to acceptance or rejection of the registrants selected by the local board for induction was made at the induction stations by the Army medical examiners.

Beginning January 1, 1942, shortly after the declaration of war, local examining physicians were required to ascertain only the readily detectable defects which would make the registrants altogether unfit for military service or fit for limited service only. A "List of Defects" (*1*, p. 249) was issued to the physicians as a guide in this procedure. The only major change in the following 2-year period was that, beginning in August 1942, the local boards no longer placed men in the limited-service group; men who would earlier have come under this category were now subject to examination at induction stations and were inducted on a quota basis.[2]

### *Classification*

Two classifications were based on physical qualifications, namely, class I for registrants considered qualified, and class IV for those unacceptable for induction into military service:

*Class I–A.* Included men acceptable for general military service. This classification was applicable to men before a physical examination, when deferment was not allowed, as well as to nondeferred men receiving a physical examination and still considered acceptable.

*Class I–B.* Included registrants found to have defects upon physical examination which made them acceptable for limited service only. This group was considered a reservoir which could be utilized as the need arose. Shortly after the outbreak of war, physical standards of the Army were lowered in regard to teeth and eye requirements, and many in class I–B became acceptable for general military service; others in this class, still not acceptable, were placed in the new class I–A remediable.

*Class I–A Remediable.* Established February 26, 1942, this class included registrants certified by the armed forces as acceptable for general military service if and when their remediable defects were corrected. The classification gradually disappeared as the armed forces inducted men with certain remediable defects for correction within the service. Men in class I–A remediable who were not inducted were eventually placed in class IV–F. Although officially discontinued in August 1942, class I–A remediable continued to appear on physical examination reports until December 1943.

*Class I–A (L).* This classification was established in July 1943 to designate men found acceptable for limited service after examination at the induction stations. Such men were sent home but could be called for induction on special demands for limited service personnel.

*Class IV–F.* Men unconditionally rejected as "physically, mentally, or morally unfit."

### *Deferment*

Deferment from military service during the war on grounds other than physical disqualification was allowed mainly on account of occupation in industry or agriculture essential to the war effort (class II), dependency (class III), and age of registrant, or a combination of these considerations. Indeed, Selective Service adopted three basic principles in this regard: (1) a plan for deferments should be formulated

[2] On a basis of not more than 10 percent of registrants accepted, by color, at any induction station on any given day. In February 1943, the quota basis was restricted to not more than 5 percent.

Table 1. *Occupational deferments by Selective Service at various periods of World War II* [1]

| Date | Number of registrants | | | Percent of registrants | | |
|---|---|---|---|---|---|---|
| | Total | Industry [2] | Agriculture [3] | Total | Industry [2] | Agriculture [3] |
| Dec. 31, 1942 [4] | 1,244,140 | 1,051,776 | 192,364 | 100.0 | 84.5 | 15.5 |
| Dec. 1, 1943 | 3,833,652 | 2,194,424 | 1,639,228 | 100.0 | 57.2 | 42.8 |
| Dec. 1, 1944 | 5,765,926 | 4,257,639 | 1,508,287 | 100.0 | 73.8 | 26.2 |
| Aug. 1, 1945 | 4,709,326 | 3,444,229 | 1,265,097 | 100.0 | 73.1 | 26.9 |

[1] Source: Selective Service Monogr. 7 (*4*).
[2] Classes II-A and II-B.
[3] Classes II-C and III-C.
[4] This period included men aged 18–44; all other periods refer to men aged 18–37.

to maintain the necessary military and civilian balance in manpower; (2) no blanket deferments should be granted and no deferment should of necessity be permanent; (3) in general, deferments should be granted before and not after physical examination, so that the count of men in physically examined classes at any time would serve as an inventory of potential military manpower available (*1*).

*Occupation.* The need for men to produce the equipment and supplies for modern warfare was perhaps as great as the need for men in the armed forces. A fairly liberal occupational deferment policy was in effect, therefore, particularly in regard to men in agriculture, until 1944. At this time the demands for younger men by the armed forces compelled Selective Service to review and reclassify all registrants under 26 years of age deferred in industry, and later, in agriculture.

Table 1 gives some idea of the number of men deferred in industry and agriculture at various periods of the war.[3] On August 1, 1945, total occupational deferments in relation to total men registered in Selective Service at that time were: white, 22.3 percent; Negro, 13.0 percent.[4]

The age factor in occupational deferments is of special significance in regard to rejection rates. During the period when occupational deferments reached a numerical peak in December 1944, more than 90 percent of the men deferred on account of occupation at this time were 26 or over, and almost three-fourths were 30–37 years old (table 2). Noteworthy is the relatively large number of men 18–25 years old deferred in agriculture at this time, in contrast to about 3 percent of men of this age deferred in industry.

According to Selective Service data, therefore, most of the occupationally deferred men, in agriculture as well as in industry, were 30 years and over and, as will be seen subsequently, rejection rates were

[3] A relatively high proportion of the occupational deferments among Negro registrants was in agriculture: December 1942, 32.9 percent; December 1943, 69.4 percent; December 1944, 46.2 percent; August 1945, 47.0 percent.

[4] In all, 2,438,831 Negro men aged 18-37 were registered by Selective Service on August 1, 1945, (*5*, p. 41). Another Selective Service publication gives the total number of registrants (all races) at this time as 22,170,021 (*6*, p. 67). Hence, the number of white registrants was taken to be the difference between these figures, each of which formed the base for the percentage of occupationally deferred men in white and Negro groups.

highest in this age category. In other words, addition of the occupationally deferred group to the number physically examined under Selective Service probably would not have decreased the over-all rejection rate.

Table 2. *Occupational deferments by Selective Service as of Dec. 1, 1944, all races, by age*[1]

| Age of registrant | Number of registrants | | | Percent of registrants | | |
|---|---|---|---|---|---|---|
| | Total | Industry | Agriculture | Total | Industry | Agriculture |
| Total | 5,765,926 | 4,257,639 | 1,508,287 | 100 0 | 100 0 | 100 0 |
| 18–25 | 470,964 | 107,261 | 363,703 | 8 2 | 2 5 | 24.1 |
| 26–29 | 1,168,094 | 864,469 | 303,625 | 20 3 | 20 3 | 20 1 |
| 30–37 | 4,126,868 | 3,285,909 | 840,959 | 71 5 | 77 2 | 55.8 |

[1] Source: Selective Service Monogr. 7 (4).

*Dependency.* During 1940–41 when a relatively small number of men was needed by the Army, the deferment policy was, in general, liberally applied to men with dependents. By April 1942, dependency alone was not considered an important consideration in deferment and, beginning in October 1943, fathers were inducted on a Nation-wide basis. It should be noted that even when relatively large numbers of men were deferred on account of dependency, most of them were 30 and over. Many of these men sooner or later went into essential industries or agriculture. Examples of the number of men deferred for dependency (class III–A) in relation to the total number registered are given below:

| Date | Men deferred on account of dependency (class III-A)[1] | | |
|---|---|---|---|
| | Age group | Number | Percent |
| Mar. 31, 1941 | 21–25 | 3,706,379 | 68.4 |
| Dec. 31, 1942 | 18–44 | 12,650,268 | 48.6 |
| Dec. 1, 1943 | 18–37 | 4,545,028 | 20.6 |
| Dec. 1, 1944 | 18–37 | 26,759 | 0.1 |

[1] Source: Selective Service Monogr. 8 (7).

*Age.* The age limits acceptable for induction varied from time to time although they never went above 44 years nor under 18 years, except that the Navy accepted enlistments of qualified 17-year-olds throughout the war.

### *Compositon of Examined Group*

On August 1, 1945, an estimated 17,954,500 men aged 18–44 at the time of examination had been physically examined through Selective Service.[5]

[5] This figure represents the estimated total number of men examined and not the number of examinations.

The men examined for induction during 1940–41, the peacetime period, constituted about 22 percent of the total registration at that time. Those examined were chiefly unmarried men aged 21–35 years (median 24.9 years). More than 3,000,000 men were examined during the first 12 months of Selective Service.

During 1942, the men examined were 20–44 years old, and during 1943 they were 18–37. At the end of these two war years, the examined group comprised about 57 percent of all the registrants. In December 1942, a ban on voluntary enlistment of men 18–37 years old made the examined group more representative of all men of these ages than formerly, but a policy of liberal occupational deferments reduced the representativeness in certain occupation groups, particularly agriculture. An estimated 10,000,000 men were physically examined during these 2 years.

Some 4,855,000 men aged 18–37 received their first examinations between January 1944 and August 1945, the last 20 months of hostilities. Many men aged 18–19 at this time, who had enlisted when 17 years old, were, of course, lost to the Selective Service pool; deferments for occupation and dependency, however, became more stringent, increasing the representativeness of the group relative to occupation. By August 1, 1945, the registrants aged 18–37 who had been physically examined through Selective Service comprised about 79 percent of the total living registrants in that age group.

### *Statistics*

Statistical information concerning the physical examination of registrants was obtained from three sources by Selective Service. First, data on classifications were compiled from the records of all the local boards, representing the total registrants on the first day of the specified month. Second, beginning in August 1944, monthly reports on physical examinations of registrants were summarized by the War Department; the principal causes for rejection constituted the only defect data in these reports. Third, two sample studies of physical examination reports were made, selected to represent first examinations only, since the results of reexamination greatly influenced the information gathered by Selective Service. The records of 981,290 men, or 7.5 percent, of an estimated 13,000,000 examined during the period November 1940 to December 1943 formed the first research sample. The other research sample represented approximately 10 percent of first examinations among men inducted or rejected during 1944.

The data used in the present report are mainly from the first and third sources, the latter referring to the research sample for 1940–43. According to Selective Service (*1*), the research sample for 1944 is of limited usefulness because the physical examination reports of a large

number of men examined in early 1944 were not available to Selective Service statisticians at the time. These men had been found acceptable on preinduction examinations but, for administrative or other reasons, had not been called up for induction.

The statistics published by Selective Service on results of the physical examinations of registrants are subject to a number of limitations pointed out by Selective Service and others (*1*, *8*). These limitations and their probable effect on the conclusions stemming from the data are noted subsequently.

## Rejection of Registrants

*Rejection Rates*

By August 1, 1945, the number of 18–37-year-old registrants rejected because of physical or mental defects in the continental United States was 5,249,200, or 30.2 percent[6] of the estimated total number examined (*3*, p. 360).[7] In no State was the rate of rejection lower than one in five men examined within this age range (fig.1). The proportion of men rejected was generally higher in the southern States, probably

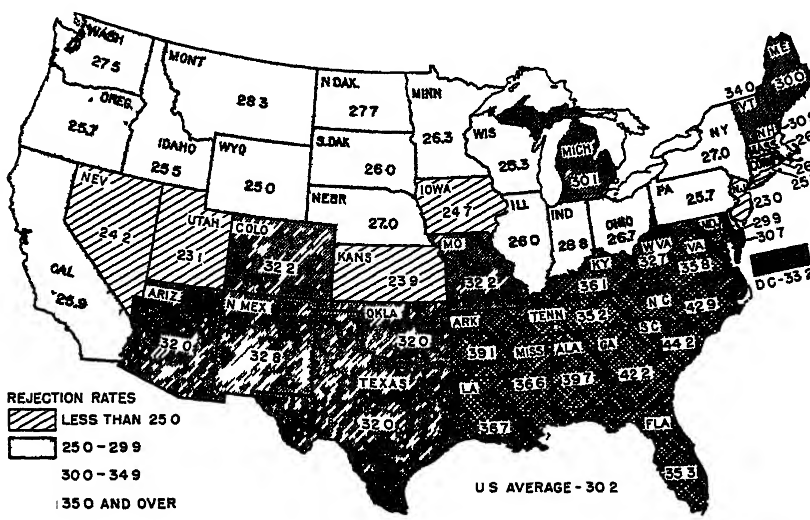


Figure 1. Percent of Selective Service registrants 18–37 years old rejected for physical or mental defects as of August 1, 1945, by State (*3*, p. 360).

[6] Including the approximately 2,267,000 registrants aged 38–44 examined before induction, with 51.6 percent of them rejected for physical or mental defects, the total rejection rate would rise to about 32.7 percent.

[7] The estimated total number of examined men includes registrant enlistees and inductees, and nonregistrant enlistees aged 18–37 on August 1, 1945, who had been discharged by that date. Excluded are 300,000 men who enlisted at 17 and would have been 18 years old as of August 1, 1945, for whom apportionment by State was not available to Selective Service (*3*). The rejected registrants include men considered acceptable only for limited military service.

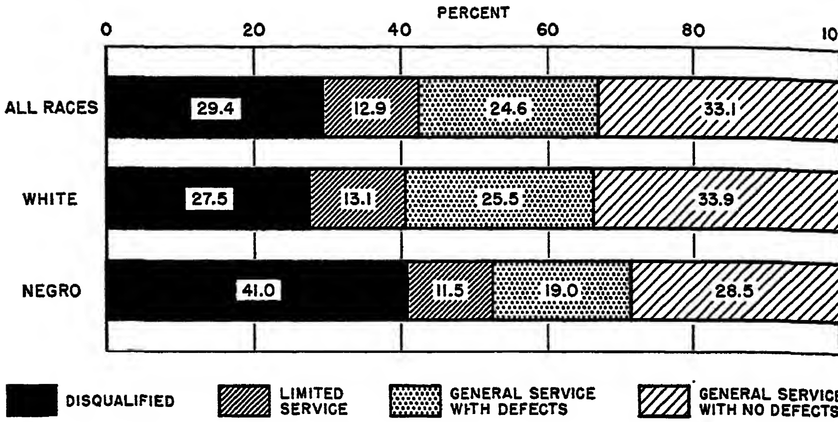


**Figure 2. Percent of registrants with physical defects by race and result of physical examination, November 1940–December 1943, continental United States (*3*, p. 68).**

due in large part to the relatively higher rates of rejection among Negroes than in the white population (fig. 2).[8]

As observed in figure 2, a substantial proportion of the registrants examined in 1940–43 was placed in the limited-service category. Combining these men with those completely disqualified, the total found unfit for general military service because of physical or mental defects was about 41 percent in the white group and 53 percent in the Negro.[9]

Caution must, of course, be used in interpreting the Selective Service statistics on rates of rejection as an index of physical fitness, even for military services. The reasons are: (1) the research data of Selective Service refer to first examinations only, and men rejected during one period may have been reexamined and accepted for military service later under changed physical standards; (2) many men within ages acceptable to the armed forces were withheld at one time or another from the examined group because of occupational or dependency deferment or direct voluntary enlistment; (3) administrative policies of the armed forces, based on fluctuating needs for men to meet training schedules or combat requirements, affected local board quotas.

In general, these factors would tend to raise the rates of rejection, although other circumstances probably more or less counterbalance this tendency. Thus, more older men (30 and over) than younger

[8] The data in fig. 2 are not entirely comparable with those shown in fig. 1. Fig. 2 represents all examined registrants aged 18–44, based on a 10-percent sample of first examinations recorded on DSS Form 200, Reports of Physical Examination, for November 1940–September 1941, and approximately 7 percent of those recorded on DSS Form 221, Reports of Physical Examination and Induction, for April 1942–December 1943. Reports for registrants examined and later deferred for other than physical or mental reasons are excluded from the sample. All subsequent tables or charts based on Selective Service data for 1940–43 are from this sample study.

[9] In the Selective Service statistics "white" includes all groups other than Negro.

were deferred on account of occupation and, as will be noted, the rate of rejection for physical defects was considerably higher in the older-age brackets. The hard fact remains that, on the basis of standards considered by the military services as minimal, millions of men could not be used for general military services because of physical or mental disabilities. This same situation of large numbers of men found unfit for general military services on account of physical defects occurred during the first World War, with a rejection rate of 31.2 percent at that time (*9*).

*Causes for Rejection*

The principal causes for rejection of men examined through Selective Service and the relative frequency of these causes are shown in figure 3.[10] More than 1 in every 10 of the examined registrants were rejected for manifestly disqualifying defects (total blindness or deafness, both arms or legs missing, chronic or severe physical or mental disorders). The five chief specific causes for rejection were, in descending order, mental disease, mental and educational deficiency, musculoskeletal defects, cardiovascular defects, and hernia. Together these five accounted for more than one in every two rejections.

*Voluntary Enlistments*

Until April 1941 men of any age acceptable for service were permitted to enlist in the armed forces. Beginning in January 1943, however, enlistments in age groups currently acceptable (18–37 years) were prohibited unless processed through Selective Service, although the Navy continued to accept 17-year-old volunteers throughout the war. The rate of rejection among men seeking enlistment for the first time and examined at recruiting stations of the Navy ranged from 49 percent in 1940 to nearly 22 percent in 1945, averaging 35.3 percent during 1940–45 (table 3). Information on the age of these men is not available, although the bulk of the recruits examined in 1943–45 probably comprised the 17-year-olds previously mentioned. Considering only the period 1943–45, the rejection rate averaged one in every four applicants.

The principal causes for rejection of the recruits during 1940–45, in the terms used by the Navy, were:

| *Cause* | *Percent rejected* | *Cause* | *Percent rejected* |
|---|---|---|---|
| Eye | 29. 5 | Genitourinary | 6. 3 |
| Dental | 19. 4 | Skin, hair, and nails | 1. 9 |
| Circulatory system | 8. 5 | Nervous system | 1. 9 |
| Motor system (mainly flat feet) | 8. 3 | Hernia | 1. 8 |
| Ear, nose, and throat | 6. 3 | | |

[10] The data relate to men completely disqualified for military service.

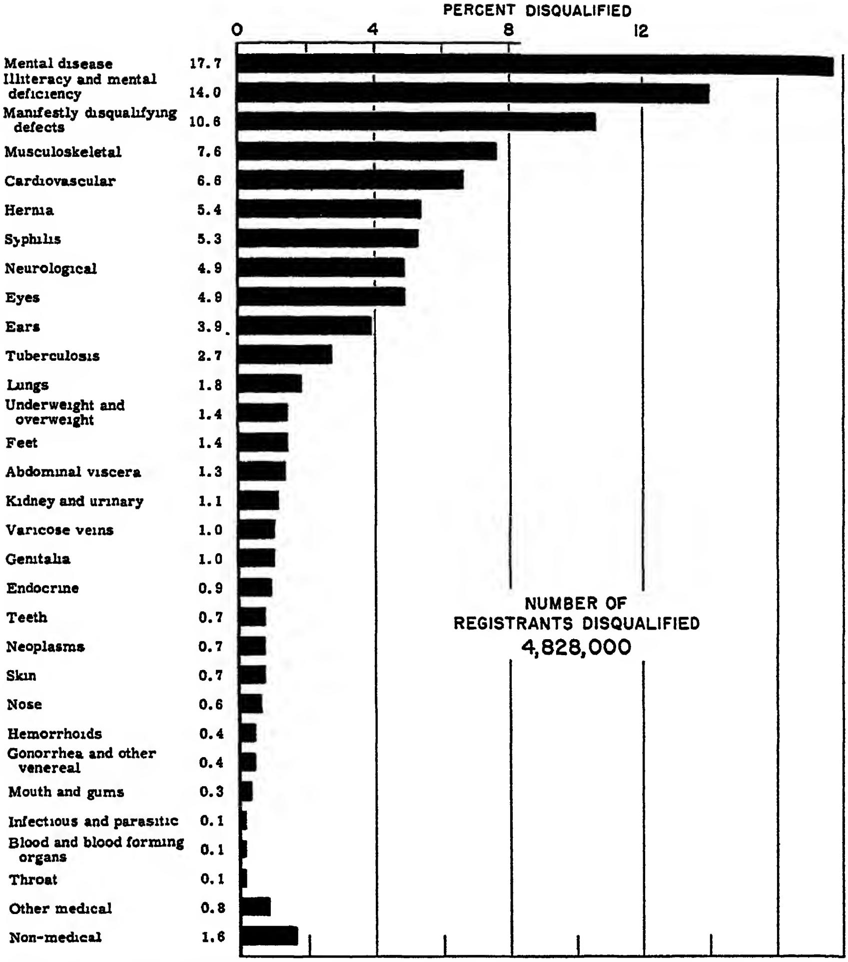


**Figure 3.** Estimated principal causes for rejection of registrants aged 18–37, examined through Selective Service, August 1, 1945 (*1*, p. 157).

Most of these defects, it will be recalled, were among the leading causes for rejection among the registrants examined through Selective Service.

The physical standards of the Navy, especially before 1943, were higher than those of the Army, yet the men seeking enlistment were probably a select group, as a rule younger than the population examined through Selective Service and, because they sought military service, presumably were generally more physically fit than registrants of comparable age brackets.

## Prevalence of Defects

Probably a better criterion of physical status than mere rejection rates is the prevalence of defects, and especially of specific defects

Table 3. *Men examined at Navy recruiting stations and number rejected for physical or mental defects* [1]

| Year | Original Navy and Marine Corps enlistments [2] | | |
|---|---|---|---|
| | Number examined | Rejected | |
| | | Number | Percent |
| Total 1940–45 | 1, 184, 773 | 413, 109 | 35. 3 |
| 1940 | 205, 616 | 101, 284 | 49. 3 |
| 1941 | 247, 064 | 99, 974 | 40. 5 |
| 1942 | 342, 568 | 118, 570 | 34. 6 |
| 1943 | 116, 734 | 39, 394 | 33. 8 |
| 1944 | 86, 360 | 18, 462 | 21. 4 |
| 1945 | 186, 431 | 40, 425 | 21. 7 |

[1] Source: Reports of the Surgeon General. Medical Statistics of the U. S. Navy, Bureau of Medicine and Surgery, Navy Department *(10, 11)*: 1940, p. 240; 1941, p. 297; 1942, p. 411; 1943, p. 277; 1944, p. 382; 1945, p. 436.
[2] Excludes persons examined at armed forces induction centers.

*(1, 12)*. It was pointed out in an earlier paper: (1) that the prevalence rates based on Selective Service data were likely to be affected by differences in examining techniques of physicians and changes in coding procedure (e. g., all defects of registrants noted in 1940–41 were recorded, whereas in 1942–43 only the three most significant defects were coded); and (2) that the given prevalence rates were very likely understatements of actual conditions, particularly for certain defects *(13)*.

The prevalence of defects, according to Selective Service statistics on physical examinations of registrants in 1940–43, was one defect

Table 4. *Prevalence of physical or mental defects per 1,000 Selective Service registrants receiving physical examinations, November 1940–December 1943* [1]

| Region [2] | Number of defects per 1,000 registrants | | | |
|---|---|---|---|---|
| | Total | Disqualified | Limited service [3] | Acceptable for general military service |
| Continental United States | 1, 105. 7 | 1, 639. 1 | 1, 814. 4 | 676. 2 |
| East | 1, 318. 3 | 2, 007. 0 | 2, 052. 7 | 1, 087. 5 |
| South | 1, 048. 3 | 1, 530. 4 | 1, 801. 4 | 612. 0 |
| Far West | 998. 1 | 1, 557. 0 | 1, 715. 3 | 529. 9 |
| Midwest | 990. 2 | 1, 562. 1 | 1, 731. 4 | 702. 9 |

[1] Source: Selective Service Monogr. 15, vol. III *(8)*: rates for continental United States, p. 116; for total registrants by region, pp. 40–42. All other rates given are the unweighted means of the several States within each region; adapted from the same source, pp. 117–162.
[2] East: Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut, New Jersey, Delaware, Maryland, Pennsylvania, New York City, New York excluding New York City, District of Columbia.
South: Texas, Oklahoma, Arkansas, Louisiana, Mississippi, Alabama, Georgia, Florida, Tennessee, Kentucky, Virginia, North Carolina, South Carolina.
Far West: Washington, Oregon, California, Nevada, Idaho, Utah, Arizona, Montana, Wyoming, Colorado, New Mexico.
Midwest: North Dakota, South Dakota, Nebraska, Kansas, Minnesota, Iowa, Missouri, Illinois, Wisconsin, Michigan, Ohio, West Virginia, Indiana.
[3] Includes class I-A remediable.

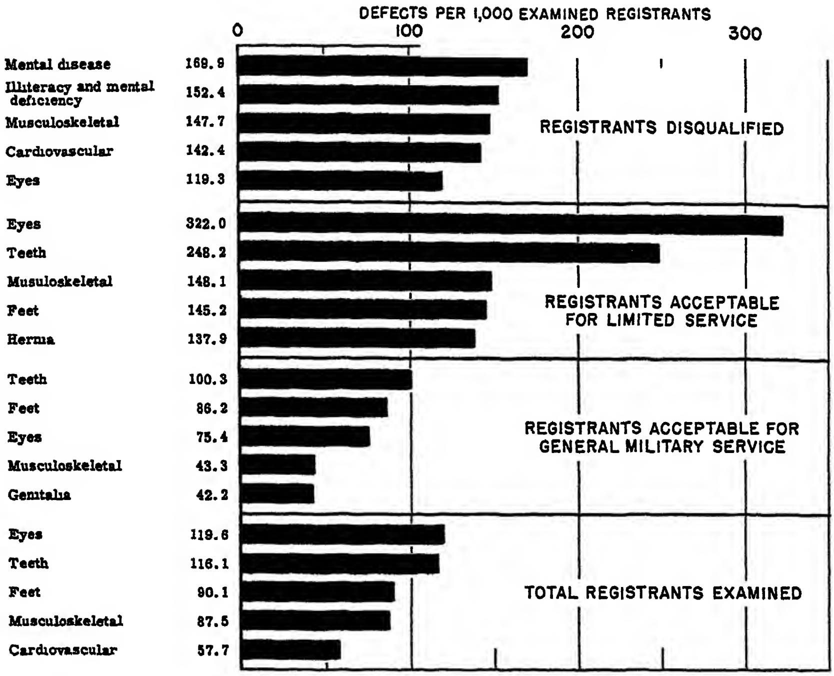


Figure 4. Five leading defects per 1,000 registrants physically examined through Selective Service, November 1940–December 1943. by disposition of men (*3*, p. 116).

per man for all registrants, more than one and a half defects per man among those disqualified for military service, and almost two defects per registrant among the men in the limited-service category (table 4). The East, comprising the New England and Middle Atlantic States, had higher prevalence rates than those of any of the other regions of the country; why, is not clear.

The 5 most prevalent defects per 1,000 registrants examined, by disposition of the men as a result of their physical examination, are shown in figure 4. Outstanding among the disqualified group was the high prevalence of mental disease and educational and mental deficiency;[11] defects of the eyes and teeth were most common in the limited-service group. By far the most prevalent forms of mental disease among the disqualified men were psychoneurotic disorders and psychopathic personality; 80 percent of the total number of men with mental disease had one or the other.

## Age

Rejection rates sharply increased with the age of the examined registrants (table 5). If the class I-A remediable and limited-service

[11] The major portion of the category "educational and mental deficiency" comprised men with educational deficiency.

Table 5. *Effect of age of registrants on rate of rejection for physical or mental defects November 1940–December 1943* [1]

| Age of examined registrants | Number of registrants | | | Percent of registrants | |
|---|---|---|---|---|---|
| | Total | Disqualified | I-A remediable and limited service | Disqualified | I-A remediable and limited service |
| All ages | 981,290 | 289,125 | 126,289 | 29.5 | 12.9 |
| 18–20 | 170,665 | 41,495 | 8,497 | 24.3 | 5.0 |
| 21–25 | 359,109 | 76,713 | 48,661 | 21.4 | 13.5 |
| 26–29 | 156,618 | 44,201 | 25,472 | 28.2 | 16.3 |
| 30–37 | 206,361 | 82,762 | 30,490 | 40.1 | 14.8 |
| 38 and over | 84,494 | 42,051 | 12,628 | 49.8 | 14.9 |

[1] Source: Selective Service Monogr. 15, appendix F, p. 10 (5). Age was unknown for a total of 4,043 examined registrants. The data refer to the sample study mentioned in footnote 8.

men are included with the disqualified group, since most of the former were also deferred, the total percentage of rejected men aged 18–20 was 29.3, and of men aged 38–44, 64.7.

The relationship between the prevalence of specific defects and age depends largely on type of defect (table 6). For example, educational and mental deficiency, and defects of the eyes and ears were more prevalent among men aged 18–25 than in the older age groups, whereas the prevalence of mental disease, cardiovascular and musculoskeltal defects, syphilis, hernia, tuberculosis, and dental defects tended to increase with age. The high rate of mental disease among the 18 to 20-year-olds reflects the frequent casesof emotional disturbances related to immaturity.

Table 6. *Prevalence rate of chief defects per 1,000 disqualified registrants physically examined through Selective Service, November 1940–December 1943, by age of registrants* [1]

| Defect | Age of examined registrants | | | | | |
|---|---|---|---|---|---|---|
| | All ages | 18–20 | 21–25 | 26–29 | 30–37 | 38+ |
| Total | 1,639.1 | 1,439.5 | 1,629.2 | 1,733.9 | 1,732.6 | 1,574.8 |
| Mental disease | 169.9 | 196.6 | 136.1 | 150.2 | 181.7 | 202.4 |
| Educational and mental deficiency | 152.4 | 216.9 | 168.5 | 145.4 | 134.8 | 93.5 |
| Musculoskeletal | 147.7 | 114.3 | 139.7 | 157.3 | 162.3 | 157.6 |
| Cardiovascular | 142.4 | 93.7 | 158.4 | 153.8 | 141.1 | 153.0 |
| Eyes | 119.3 | 132.6 | 122.4 | 123.4 | 114.7 | 106.5 |
| Teeth | 91.3 | 54.3 | 76.9 | 106.6 | 109.8 | 102.7 |
| Neurological | 77.1 | 76.8 | 82.4 | 76.2 | 70.7 | 80.7 |
| Ears | 74.9 | 77.9 | 93.5 | 77.7 | 64.3 | 56.9 |
| Feet | 73.9 | 56.8 | 83.7 | 95.3 | 81.5 | 36.2 |
| Hernia | 68.5 | 54.9 | 58.4 | 71.4 | 80.2 | 74.9 |
| Syphilis | 67.7 | 28.5 | 48.6 | 61.6 | 85.3 | 112.5 |
| Tuberculosis | 44.4 | 32.1 | 37.8 | 39.9 | 47.1 | 68.4 |

[1] Source: Selective Service Monogr. 15, appendix F, pp. 164–168 (5).

## Race

The results of the physical examinations of registrants through Selective Service are available by race, that is, for the Negro and

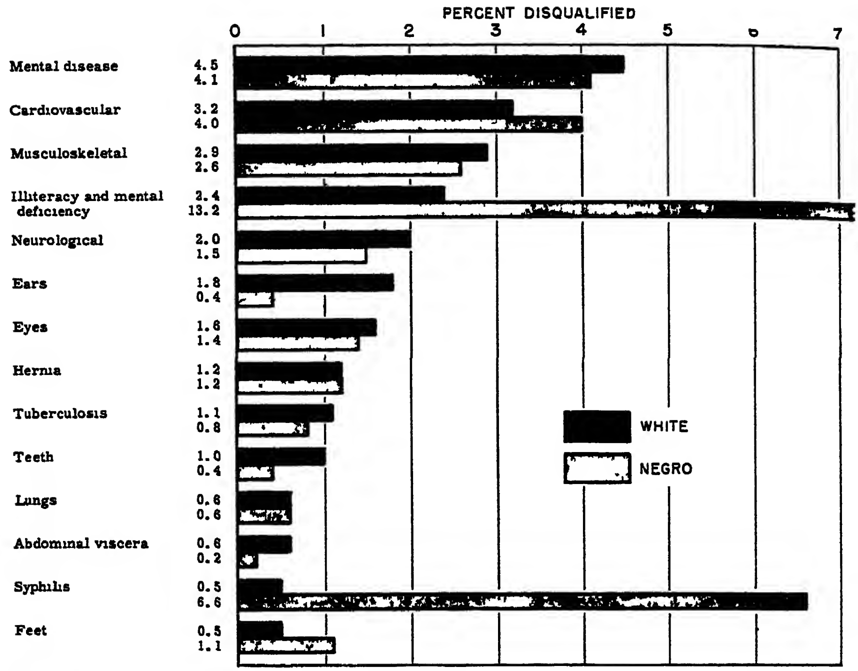


Figure 5. Principal defects per 100 disqualified registrants examined through Selective Service, November 1940–December 1943, by race (*3*, p. 68).

whites, the latter referring to all others beside the Negro. Information on the health status of different groups of Americans undoubtedly can serve a useful purpose by indicating the special needs of particular groups, thereby affording an opportunity for more intelligent efforts at prevention and rehabilitation. It should be noted, however, that other factors than the genetic one may play an important if not preponderant role in the prevalence of certain diseases or defects. It is well known, for example, that socioeconomic circumstances among both groups considerably influence the occurrence of illiteracy, syphilis, and tuberculosis (*14*, *15*).

It has already been noted that relatively more Negro than white registrants were disqualified for physical and mental defects (fig. 2). A comparison of the principal defects in the two groups of disqualified men (fig. 5) shows that relatively many more Negroes than whites were rejected because of illiteracy and syphilis, each of which, it may be noted, is largely a remediable and preventable defect. Illiteracy and syphilis together accounted for almost half the total number rejected among Negro registrants examined through Selective Service.[12] Other data referring to Negro registrants are considered in later sections.

[12] The somewhat higher rate of tuberculosis in the white than Negro group must be read with caution. Probably one explanatory factor is the greater tuberculosis mortality rate among Negroes (*23*, p. 10; *24*); another is the fact that men rejected because of illiteracy were not given a physical examination, and as shown in fig. 5 a higher proportion of Negroes than whites were rejected for illiteracy (*25*, p. 188; *26*).

## Urban and Rural Registrants

There is apparently little difference in the rejection rates of men in urban and rural areas as such; for urban and rural communities the rates were 45.3 percent and 42.7 percent, respectively (*1*).[13] Comparing men engaged in agricultural and nonagricultural employment, however, the proportion of men disqualified on account of physical or mental defects is definitely higher in the farming group, both for Negroes and whites, and at all ages (table 7). If the class I-A remediable and limited-service men are added to the disqualified, the rates of total rejection are:

| *Race* | *Percent rejected* | |
|---|---|---|
| | *Farmers* | *Nonfarmers* |
| Total | 48.0 | 41.5 |
| White | 44.7 | 39.4 |
| Negro | 60.2 | 50.9 |

The prevalence of defects per 1,000 registrants examined through Selective Service was about the same among farmers and nonfarmers, although striking differences did occur in the prevalence of specific defects (figs. 6a, 6b).[14] Thus, among the whites the rates of illiteracy and mental deficiency, mental disease, and defects involving the mouth and gums and throat were considerably higher among the farmers, while defects of the eyes and teeth in particular were more prevalent among the men engaged in nonagricultural employment. In the Negro group substantial differences between farmers and nonfarmers occurred in the prevalence rates of illiteracy and mental

Table 7. *Percent of physically examined registrants disqualified from any military services, November 1940–December 1943: men engaged in agriculture versus nonagricultural employment, by race* [1]

| Type of employment | Age of registrants examined | | | | | |
|---|---|---|---|---|---|---|
| | All ages | 18-20 | 21-25 | 26-29 | 30-37 | 38+ |
| Total registrants: | | | | | | |
| Agricultural | 36.9 | 39.9 | 27.6 | 35.4 | 48.0 | 56.5 |
| Nonagricultural | 28.3 | 22.1 | 20.2 | 27.3 | 39.2 | 48.8 |
| White: [2] | | | | | | |
| Agricultural | 33.1 | 36.6 | 24.0 | 30.7 | 43.2 | 54.5 |
| Nonagricultural | 26.7 | 20.7 | 19.2 | 25.7 | 37.2 | 47.0 |
| Negro: | | | | | | |
| Agricultural | 50.9 | 51.8 | 41.5 | 51.7 | 63.8 | 67.8 |
| Nonagricultural | 38.9 | 33.2 | 27.3 | 37.8 | 49.7 | 60.9 |

[1] Source: Selective Service Monogr. 7, pp. 258-261 (*4*).
[2] Includes all races other than the Negro.

[13] Acceptance rates for general military services, rather than rejection rates, are given in the source. The latter were obtained by simple subtraction. Urban refers to cities of 2,500 or more people; rural refers to communities of less than 2,500 population.

[14] Occupational variations in rates of rejection and in major defects among registrants examined through Selective Service are discussed by Smith (*27*).



940095—51——3

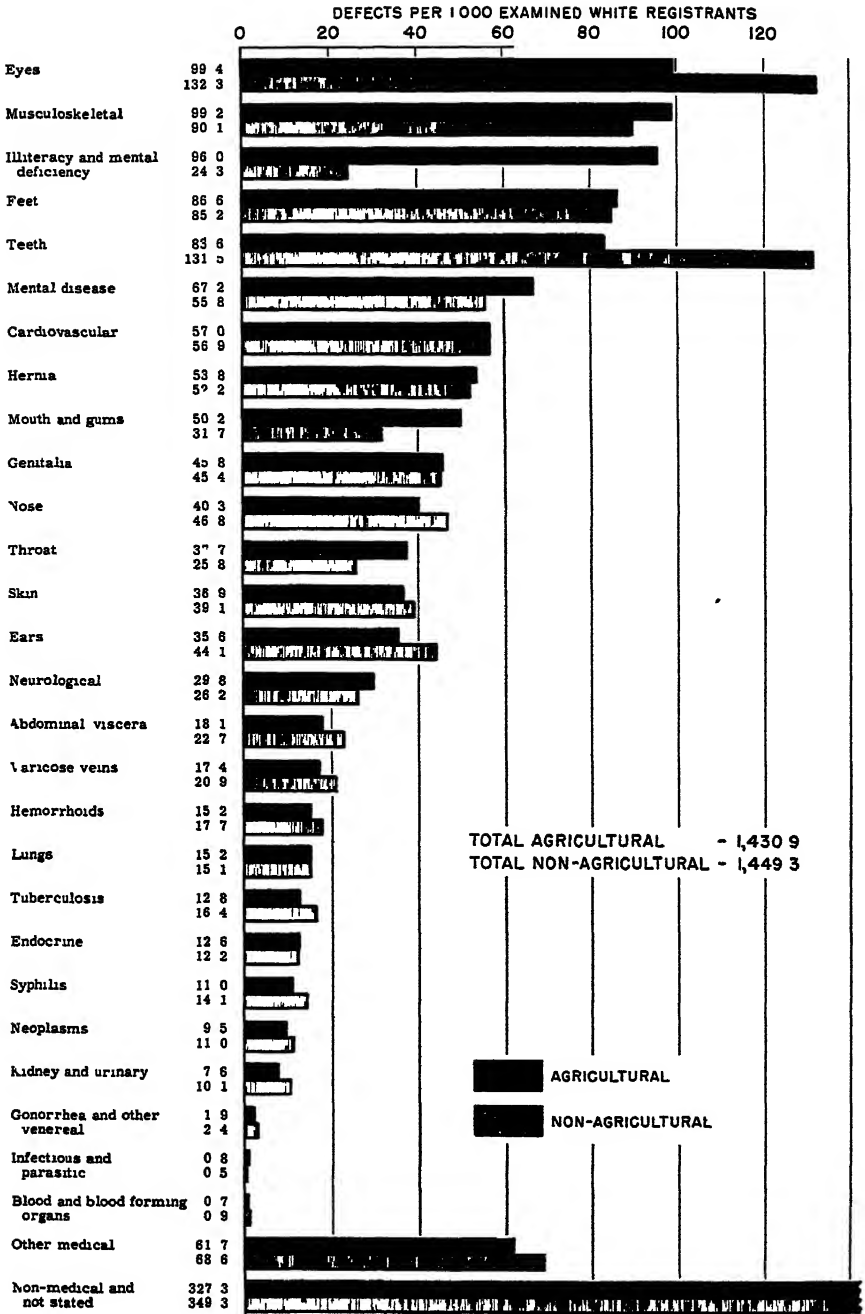


**Figure 6a** Prevalence of defects per 1,000 white registrants in agricultural and non-agricultural employment examined through Selective Service, November 1940–December 1943 (4, p. 264).

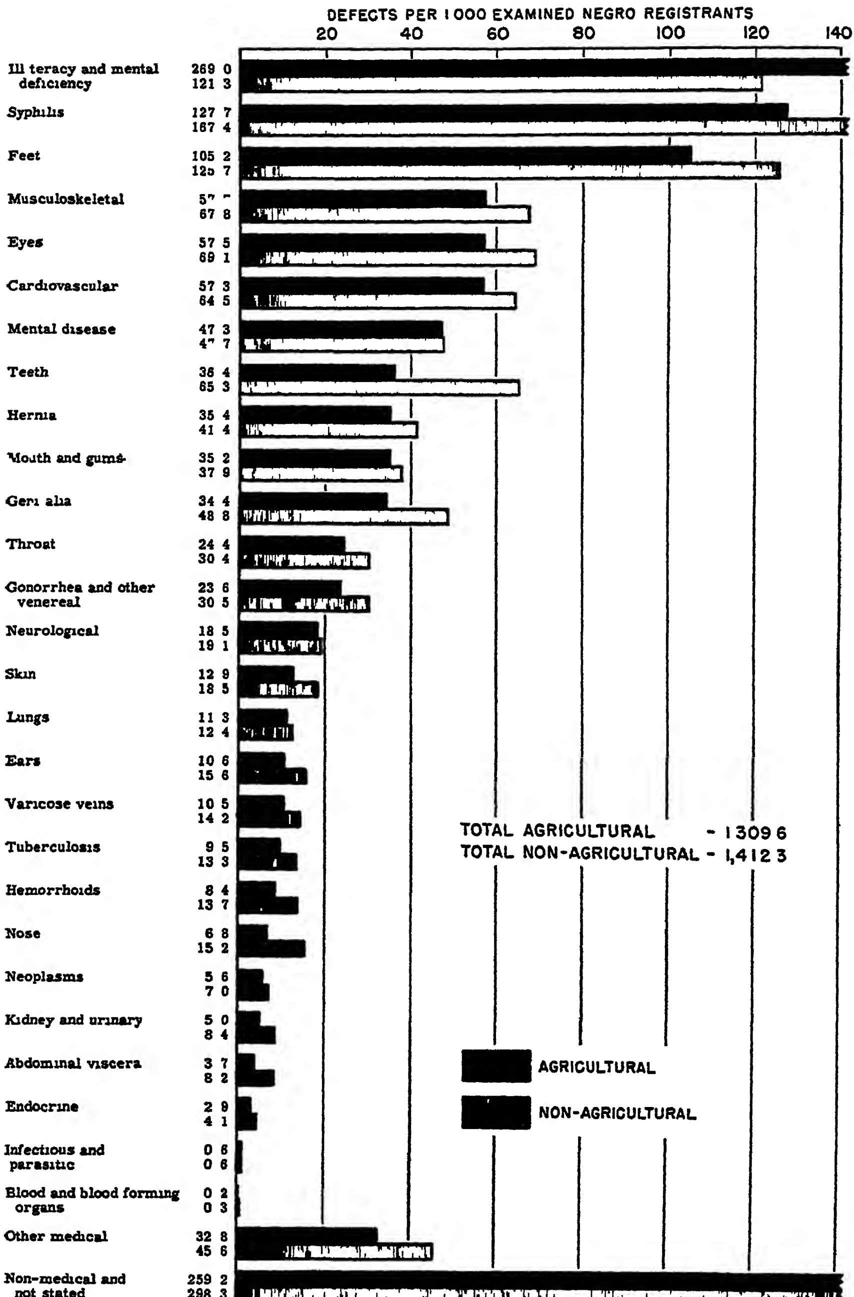


**Figure 6b. Prevalence of defects per 1,000 Negro registrants in agricultural and nonagricultural employment examined through Selective Service, November 1940–December 1943 (4, p. 264)**

deficiency, syphilis, hemorrhoids, defects of feet, teeth, genitalia, nose, and abdominal viscera.

## Rehabilitation and Prevention

In July 1944, the medical director of Selective Service gave as his considered opinion that "from 15 to 20 percent of men rejected for military service are rejected because of disqualifying defects which could have been easily remedied" (*12*). His "consèrvative estimate" was that 700,000 of 4,200,000 IV–F's had been rejected for remediable defects.

*Rehabilitation Plans*

The large numbers of young men found unfit for general military service early in the draft aroused public and official opinion to the need of doing something about the situation. The President, in October 1941, thereupon charged the Selective Service System "with the administration of a program for rehabilitation of rejected men between the ages of 21 and 28 found by the Army to have remediable defects." Subsequently a conference on the problems of rehabilitation was sponsored by Selective Service and was attended by representatives of schools and hospitals, medicine and dentistry, social agencies, the Federal Government, and others. It was agreed upon at the assembly that rehabilitation should be restricted to defects which the Army had found amenable to correction and that a rehabilitation program should include only registrants certified by the Army in advance as acceptable if the defect or defects were remedied. On this basis, plans were drawn for the rehabilitation of about 200,000 men with defects deemed remediable without surgery. The remedy was to be provided by physicians and dentists in the locality in which the registrant resided, and Federal funds were to pay for the services.

Other features of the Selective Service rehabilitation plan emanating from the conference were (*1*):

1. The Director of Selective Service was to submit to the State directors, from time to time, the names of physicians and dentists in their respective States who had been placed on a national roster of designated physicians and dentists. These examiners would be authorized to particpate in the rehabilitation program. Applications for participation could be filled out and submitted to the State director. Physicians and dentists not designated could be invited by the local boards to make such application.

2. Card files of designated physicians and dentists were to be maintained by the State headquarters and the local boards.

3. Registrants certified by induction-station examiners as acceptable for general military service after correction of specified remediable defects could choose one of the designated physicians, dentists, or

facilities in his community or name another of his choice. The physician, dentist, or facility named by the registrant would then be invited to make application for designation.

4. Any registrant certified as having a remediable defect or defects was advised that correction would be made at Government expense, and that if he refused treatment or correction his deferred status would be waived and he would be subject to induction. He was required to execute a rehabilitation statement indicating his desire for or refusal of rehabilitation.

5. A form, Inquiry for Undertaking of Service, was addressed to the designated individual or facility approved. This form stated maximum fees allowable for correction of the defects named and requested a statement as to willingness to undertake the rehabilitation. Upon approval of the project, the local board mailed to the registrant an Order to Registrant to Have Defects Remedied.

In January 1942, before the plans for a Nation-wide rehabilitation program were put into effect, pilot tests were initiated in Maryland and Virginia. The results of these tests were "not wholly satisfactory" despite general cooperation of all concerned, for the number of cases that could be remedied without surgical treatment was found to be small relative to the number needing surgery. In addition, a change in Army standards made many registrants acceptable who had been scheduled for rehabilitation. These circumstances, together with an increasingly critical shortage of civilian physicians during the early months of 1942, prompted Selective Service to request that it be relieved of the responsibility for the rehabilitation program.

A word may be said about non-Federal attempts at rehabilitation of rejectees. New Jersey, for example, opened five centers where disqualified men were interviewed at the time of rejection by a representative of its rehabilitation commission. Men wishing rehabilitation had this service made available to them by the State. In New York City hundreds of surgical cases received surgical treatment with cure and subsequent induction of the registrant.

### *Rehabilitation in the Army*

The urgent need for additional military manpower induced the Army, beginning in August 1942, to induct approximately 1½ million men with major defects and make them fit for duty (*16*). Some of the principal defects treated in the Army's rehabilitation program were:

*Dental defects.* Prior to Pearl Harbor dental defects led all other causes for rejection of men called up for examination by Selective Service (4.3 percent). Army regulations at this time called for 6 serviceable opposing posterior teeth out of a normal complement of 20 and 6 opposing anterior teeth out of a natural total of 12. Dental standards were subsequently lowered and some 1 million men with

major dental defects were inducted and treated in the service (e. g. 1,400,000 bridges and dentures were supplied and 31,000,000 cavities were filled).

*Eyes.* More than 250,000 men with impaired vision were inducted. The eye defects of these men were corrected chiefly by providing them with suitable glasses.

*Venereal diseases.* From October 1942 to April 1944, 138,723 men with venereal disease were inducted by the Army (syphilis, 96,626; gonorrhea, 39,455; other, 2,642). Special venereal hospitals were built at each of 34 reception centers, with a total of 6,510 beds. Individuals with gonorrhea, chancroid, and so forth, were cured and returned for processing and assignment; men with syphilis, after several treatments at the hospital, were also sent back for assignment, the treatment being completed in the field while on duty (*12*).

Published results of treatment of about 31,000 soldiers having early syphilis, by an identical penicillin schedule conducted from June 1944 to December 1945, show a total failure rate of 159.1 per 1,000 treated patients, or conversely, a "success" rate of about 84 percent of the cases treated (*17*).

*Illiteracy.* Between November 1940 and August 1, 1945, some 367,700 white and 308,600 Negro registrants had been rejected because of "educational and mental deficiency" (*1*). The educational factor was by far the greater. Thus, of registrants disqualified principally because of educational and mental deficiency in 1940–43, the educational factor accounted for 68.4 percent of the total among the whites and 89.4 percent of the total among the Negroes (*1*).

Beginning in the late spring of 1943, illiteracy was removed as a cause for rejection. Between June of that year and September of 1945, a total of 218,000 illiterates and 69,000 others who had not passed the Army general classification (mental) test were dispatched immediately after induction to one of the several special training units set up to rehabilitate these men. Four out of five of these men (83 percent) learned enough reading, arithmetic, and Army discipline in 3 to 4 months to enable them to satisfy the requirements of the Army for general military service (*18*). Negroes and whites did equally well in this "literacy" course organized by the Army (*19*).

### *Prehabilitation*

In an effort to provide for rehabilitation of men with remediable defects before actual examination by Selective Service or the Army, the former proposed: (1) an educational program concerning the physical standards of the Army; (2) examination by the family doctor or dentist of men who appeared to fall short of the requirements; (3) correction of defects at the registrant's expense and by the family physician or dentist; and (4) a certification of "prehabilitation" by

the doctor responsible for the correction of the defects. This prehabilitation plan was never officially carried out on a Nation-wide basis. So far as known, there are no published statistics on the effectiveness of this attempt at prehabilitation by Selective Service.

*Cost of Rehabilitation*

Selective Service estimated that the average cost of rehabilitating 200,000 men for general military service might run as high as $87 for one defect per registrant. It was further estimated that approximately three-fourths of the men would have a second defect which could be corrected at a possible cost of two-thirds as much as that for the first defect (*1*).

In the pilot test programs of rehabilitation by Selective Service in Maryland and Virginia, mentioned previously, dental rehabilitation largely consisted of extracting infected teeth and replacing them with prosthetic dentures. The average cost of dental rehabilitation was $54.19, and the average time from certification to cure was 38.5 days (*12*).

*Prevention*

A considerable body of published evidence strongly suggests that many of the defects of men rejected for general military services could have been prevented from becoming a serious impairment or from occurring at all. For example, of white children reared in five large North Carolina orphanages, only 1.4 percent were rejected by Selective Service in contrast to a white rejection rate of 44.6 percent for the State as a whole, a difference attributed largely to the better pediatric and surgical care received in the orphanage compared with that available to other children in the State (*20*). Studies of school health records of young men rejected in Hagerstown, Md., because of defective dentition and vision showed that the same defects had been noted 15 years earlier in school examinations of these same individuals (*21*). Various authorities might not agree on the exact proportions of preventable or remediable defects, or on all the defects amenable to prevention or remedy, but there seems to be general agreement that an effective health program should begin in early childhood as a basic preventive measure.

*Physical Fitness*

A National Committee on Physical Fitness was created by the President in 1943 within the Federal Security Agency, charged with the responsibility of promoting an interest in physical fitness among the population at large. Brochures on the subject were published and programs for attaining physical fitness were encouraged through schools and colleges, institutional organizations, and so forth. Dr. Rowntree has commented on the program thus (*22*):

The National Committee on Physical Fitness specifically requested the cooperation of the American Medical Association (1) through a committee of five to act jointly with a similar group from the National Committee in the development and operation of a physical fitness special emphasis year; (2) the designation of a year beginning September 1, 1944, as the "Physical Fitness Year" during which the Physical Fitness Program would be put into effect on a Nationwide basis; (3) in the announcement by high authority (President or Congress) of the Physical Fitness Year; (4) to develop future planning during the Physical Fitness Year, which might include the consideration of a suitable organization to handle the problem in perpetuity and to forestall for the future a recurrence of the situation such as herein revealed [high rates of rejection for physical defects]; . . . and (5) a National Physical Fitness Foundation might well merit and receive liberal private and public support.

The American Medical Association appointed a committee of five which participated in the National Committee's efforts to encourage programs of physical fitness. So far as known, there are no published national statistics on the effectiveness of the National Committee's work. The committee was terminated June 30, 1945.

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# Incidence of Disease

*No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring*

## UNITED STATES

### Reports From States for Week Ending April 21, 1951

*Influenza*

In collaboration with the Influenza Information Center, National Institutes of Health, the following report on influenza has been prepared.

The number of cases of influenza decreased in the current week to 3,499 compared with 5,898 for the previous week. For the same week last year, 4,789 cases were reported.

Dr. Morris Shaeffer, Director of the Regional Laboratory in Montgomery, Ala., reports that of eight paired sera recently submitted for influenza tests, three showed significant rises in titer: two against influenza A-prime (FM-1 strain) for patients in Phoenix, Ariz., and one against influenza A (PR-8 strain) from a patient in Chicago.

*Poliomyelitis*

The incidence of poliomyelitis since the seasonal low week has been approximately the same as that for last year. For the 3 weeks ended April 21, 1951, a total of 181 cases was reported as compared with 185 for the same period last year.

### Epidemiological Reports

*Anthrax*

Dr. James C. Hart, Director, Bureau of Preventive Medicine, Connecticut State Department of Health, reports a case of anthrax in an employee in a felt manufacturing plant. The diagnosis was confirmed by laboratory test. The patient is recovering.

*Infectious Hepatitis*

Dr. H. H. Cosman, Delaware Deputy State Health Officer, reports an outbreak of 17 cases of infectious hepatitis in Kent County. Eight of the cases were in children attending a 1-room school in Dover. In the instance of 2 brothers, the onset of the second case was 37 days after the first case. Three cases were ambulatory. The 9

cases in adults had no direct connection with each other. It was thought that certain of the cases had influenza which was endemic at the time, but laboratory examinations indicated subclinical jaundice.

*Hookworm*

Dr. A. S. McCown, Virginia Department of Health, reports a high incidence of hookworm infection in a State hospital for the mentally defective. Of 100 stool specimens examined, 32 showed hookworm ova. Many had pinworm or whipworm. Many of these patients are incontinent and in warm months wander around barefooted because they will not wear shoes. Eosinophilia and anemia were common findings. Attendants did not show evidence of infestation.

*Ringworm*

Dr. W. L. Halverson, California Director of Health, reports approximately 80 cases of ringworm in school children in one county. Some were proved to be due to *Microsporon canis*. The parents have been advised that ringworm exists in the school, that some of the cases are due to contact with infected dogs or cats, and that the animals should be sent to a veterinarian for examination as to ringworm infection. All veterinarians in the area offered free examination of pets.

***Comparative Data for Cases of Specified Reportable Diseases: United States***

[Numbers after diseases are International List numbers, 1948 revision]

| Disease | Total for week ended— | | 5-year median 1946-50 | Seasonal low week | Cumulative total since seasonal low week | | 5-year median 1945-46 thru 1949-50 | Cumulative total for calendar year— | | 5-year median 1946-50 |
|---|---|---|---|---|---|---|---|---|---|---|
| | Apr. 21, 1951 | Apr. 22, 1950 | | | 1950-51 | 1949-50 | | 1951 | 1950 | |
| Anthrax (062) | 1 | ------- | 1 | (1) | (1) | (1) | (1) | 24 | 9 | 16 |
| Diphtheria (055) | 65 | 110 | 180 | 27th | 4,307 | 6,614 | 9,517 | 1,400 | 2,343 | 3,159 |
| Encephalitis, acute infectious (082) | 19 | 16 | 10 | (1) | (1) | (1) | (1) | 241 | 215 | 131 |
| Influenza (480-483) | 3,499 | 4,789 | 1,357 | 30th | [2] 121,340 | 137,371 | 137,371 | [2] 106,798 | 126,787 | 123,417 |
| Measles (085) | 22,566 | 13,539 | 27,438 | 35th | [2] 271,690 | 152,231 | 313,117 | [2] 242,989 | 133,101 | 278,171 |
| Meningitis, meningococcal (057.0) | 95 | 91 | 91 | 37th | 2,692 | 2,447 | 2,397 | 1,731 | 1,533 | 1,425 |
| Pneumonia (490-493) | 1,603 | 2,216 | (3) | (1) | (1) | (1) | (1) | [4] 31,985 | 40,854 | (3) |
| Poliomyelitis, acute (080) | 52 | 60 | 39 | 11th | 268 | 309 | 158 | 1,480 | 1,440 | 754 |
| Rocky Mountain spotted fever (104) | 1 | ------- | 3 | (1) | (1) | (1) | (1) | 5 | 16 | 16 |
| Scarlet fever (050) [5] | 2,112 | 1,425 | 2,055 | 32d | 52,015 | 44,259 | 66,270 | 36,324 | 27,820 | 42,880 |
| Smallpox (084) | ------- | 2 | 5 | 35th | 13 | 41 | 61 | 5 | 20 | 40 |
| Tularemia (059) | 10 | 18 | 16 | (1) | (1) | (1) | (1) | 220 | 334 | 334 |
| Typhoid and paratyphoid fever (040,041) [6] | 48 | 37 | 52 | 11th | 204 | 208 | 228 | 639 | 718 | 718 |
| Whooping cough (056) | 1,382 | 2,750 | 1,952 | 39th | [2] 46,204 | 63,062 | 63,062 | [2] 24,602 | 41,435 | 34,858 |

[1] Not computed.
[2] Deductions—Arizona, week ended Apr. 14: Influenza, 50 cases; measles, 30; whooping cough, 11.
[3] Data not available.
[4] Addition: Tennessee, week ended Apr. 7, 49 cases.
[5] Including cases reported as streptococcal sore throat.
[6] Including cases reported as salmonellosis.

*Psittacosis*

In a follow-up investigation of a case of psittacosis in Chicago, Ill., it was determined that infection was presumably a result of contact with parrots purchased from a peddler in California. This peddler is known to authorities in California since he has been arrested twice for smuggling cages of birds across the California-Mexican border. Two cases of psittacosis have been reported from Chicago since January 1.

*Rabies in Animals*

The Nebraska Department of Health reports that rabies has been proved or suspected in domestic and wild animals in Greeley County. Game wardens have reported clinical symptoms similar to rabies in several coons. Cats with symptoms of rabies were found in one area. A positive diagnosis of rabies in a calf was made April 11 at the State Health Department laboratory.

## Reported Cases of Selected Communicable Diseases: United States, Week Ended Apr. 21, 1951

[Numbers under diseases are International List numbers, 1948 revision]

| Area | Diphtheria (055) | Encephalitis, infectious (082) | Influenza (480–483) | Measles (085) | Meningitis, meningococcal (057.0) | Pneumonia (490–493) | Poliomyelitis (080) |
|---|---|---|---|---|---|---|---|
| **United States** | **65** | **19** | **3,499** | **22,566** | **95** | **1,603** | **52** |
| **New England** | **2** | **1** | **35** | **661** | **3** | **41** | - |
| Maine | - | - | 19 | 5 | - | 7 | - |
| New Hampshire | - | - | 1 | 27 | - | - | - |
| Vermont | - | - | - | 142 | - | - | - |
| Massachusetts | 2 | 1 | - | 368 | 2 | - | - |
| Rhode Island | - | - | 1 | 7 | - | - | - |
| Connecticut | - | - | 14 | 112 | 1 | 34 | - |
| **Middle Atlantic** | **8** | **6** | **202** | **3,029** | **17** | **218** | **4** |
| New York | 1 | 2 | [1] 159 | 1,110 | 9 | 60 | 3 |
| New Jersey | 1 | 4 | 43 | 561 | 4 | 92 | - |
| Pennsylvania | 6 | - | - | 1,358 | 4 | 66 | 1 |
| **East North Central** | **6** | **5** | **32** | **3,323** | **16** | **112** | **3** |
| Ohio | 5 | - | - | 949 | 6 | - | 1 |
| Indiana | - | - | 5 | 127 | - | 8 | - |
| Illinois | 1 | 3 | 14 | 586 | 7 | 67 | 2 |
| Michigan | - | 1 | 13 | 433 | 1 | 37 | - |
| Wisconsin | - | 1 | - | 1,228 | 2 | - | - |
| **West North Central** | **2** | **1** | **72** | **1,396** | **7** | **71** | **7** |
| Minnesota | - | 1 | 11 | 86 | 2 | 10 | 2 |
| Iowa | - | - | - | 110 | 1 | 2 | - |
| Missouri | 2 | - | 11 | 309 | 1 | 1 | - |
| North Dakota | - | - | 50 | 112 | 1 | 44 | - |
| South Dakota | - | - | - | 12 | - | - | 4 |
| Nebraska | - | - | - | 36 | 1 | - | - |
| Kansas | - | - | - | 731 | 1 | 14 | 1 |
| **South Atlantic** | **12** | - | **1,672** | **1,678** | **18** | **233** | **6** |
| Delaware | - | - | - | 21 | 1 | - | 1 |
| Maryland | 1 | - | 3 | 183 | 2 | 29 | - |
| District of Columbia | - | - | - | 99 | 1 | 17 | - |
| Virginia | 2 | - | 615 | 825 | 1 | 99 | - |
| West Virginia | - | - | 558 | 108 | 4 | 32 | 2 |
| North Carolina | 5 | - | - | 93 | 2 | - | 1 |
| South Carolina | - | - | 139 | 27 | 3 | 30 | - |
| Georgia | 4 | - | 357 | 231 | 1 | 26 | 2 |
| Florida | - | - | - | 100 | 3 | - | - |
| **East South Central** | **5** | **2** | **139** | **575** | **6** | **145** | **3** |
| Kentucky | - | - | 8 | 326 | 3 | 20 | - |
| Tennessee | - | 1 | 111 | 88 | 1 | - | 2 |
| Alabama | 4 | - | - | 115 | 1 | 90 | - |
| Mississippi | 1 | 1 | 20 | 51 | 1 | 35 | 1 |
| **West South Central** | **20** | **1** | **898** | **5,089** | **18** | **599** | **15** |
| Arkansas | 3 | - | 799 | 493 | - | 92 | - |
| Louisiana | 1 | - | 10 | 54 | 5 | 78 | 4 |
| Oklahoma | 2 | - | 89 | 192 | - | 26 | - |
| Texas | 14 | 1 | - | 4,350 | 13 | 403 | 11 |
| **Mountain** | **3** | **1** | **315** | **1,585** | **3** | **72** | **1** |
| Montana | 1 | 1 | 23 | 36 | 1 | - | - |
| Idaho | - | - | - | 187 | - | - | - |
| Wyoming | - | - | - | 53 | - | 5 | - |
| Colorado | 2 | - | 17 | 445 | - | 13 | - |
| New Mexico | - | - | 2 | 86 | 1 | 18 | - |
| Arizona | - | - | 273 | 631 | - | 36 | - |
| Utah | - | - | - | 102 | - | - | 1 |
| Nevada | - | - | - | 45 | 1 | - | - |
| **Pacific** | **7** | **2** | **134** | **5,230** | **7** | **112** | **13** |
| Washington | - | - | 39 | 946 | - | - | - |
| Oregon | 2 | - | 60 | 828 | 1 | 27 | - |
| California | 5 | 2 | 35 | 3,456 | 6 | 85 | 13 |
| Alaska | - | - | 3 | - | - | - | - |
| Hawaii | - | - | - | 2 | - | - | 1 |

[1] New York City only.

*Anthrax:* Pennsylvania, 1 case.

## Reported Cases of Selected Communicable Diseases: United States, Week Ended Apr. 21, 1951—Continued

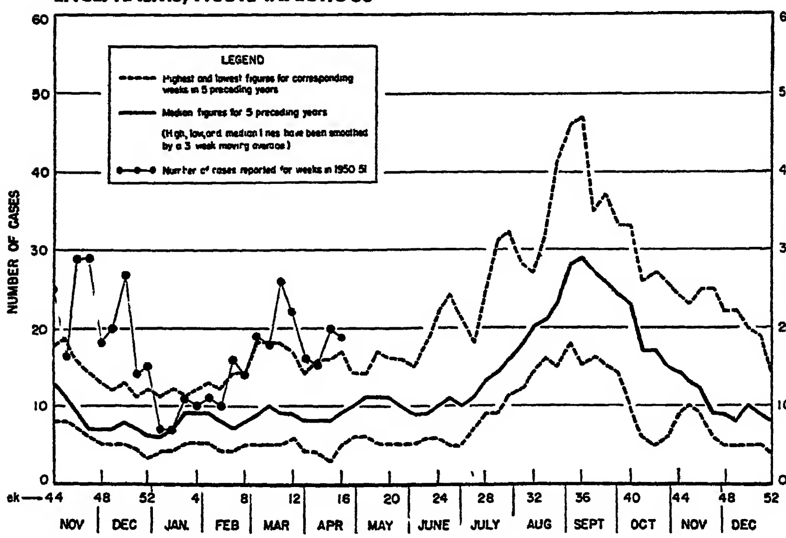
[Numbers under diseases are International List numbers, 1948 revision]

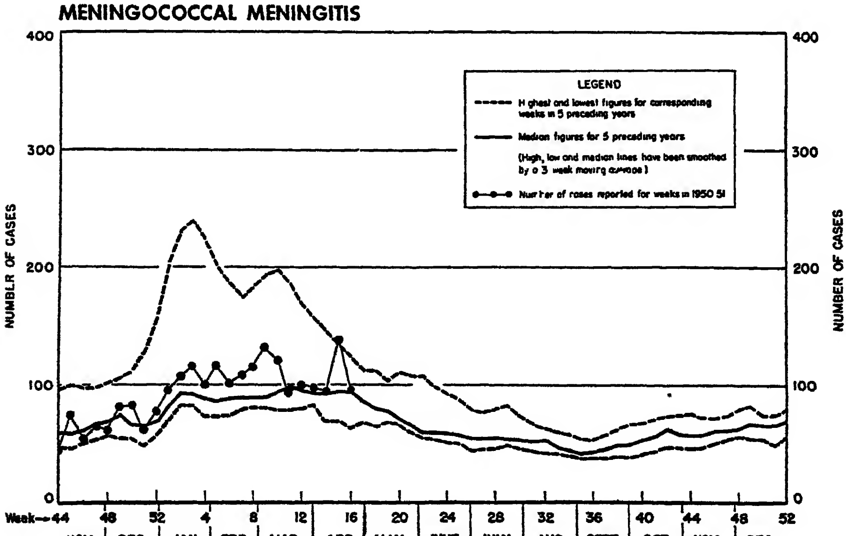
| Area | Rocky Mountain spotted fever (104) | Scarlet fever (050) | Smallpox (084) | Tularemia (059) | Typhoid and paratyphoid fever [1] (040,041) | Whooping cough (056) | Rabies in animals |
|---|---|---|---|---|---|---|---|
| **United States** | 1 | 2,112 | | 10 | 48 | 1,382 | 208 |
| **New England** | | 202 | | | 1 | 78 | |
| Maine | | 15 | | | | 33 | |
| New Hampshire | | [2] 8 | | | | 1 | |
| Vermont | | 4 | | | | 6 | |
| Massachusetts | | 144 | | | 1 | 27 | |
| Rhode Island | | 6 | | | | 6 | |
| Connecticut | | 25 | | | | 5 | |
| **Middle Atlantic** | | 405 | | 5 | 5 | 164 | 8 |
| New York | | [2] 217 | | 3 | 1 | 55 | 7 |
| New Jersey | | 53 | | 2 | | 66 | |
| Pennsylvania | | 135 | | | 4 | 43 | 1 |
| **East North Central** | | 614 | | 1 | 4 | 185 | 18 |
| Ohio | | 136 | | | 3 | 29 | 4 |
| Indiana | | 45 | | | | 13 | 9 |
| Illinois | | 90 | | | | 27 | 1 |
| Michigan | | 274 | | | | 55 | 4 |
| Wisconsin | | 69 | | 1 | 1 | 61 | |
| **West North Central** | | 115 | | | 2 | 38 | 78 |
| Minnesota | | 26 | | | 1 | | |
| Iowa | | 17 | | | | 3 | 14 |
| Missouri | | 26 | | | 1 | 6 | 63 |
| North Dakota | | | | | | 6 | |
| South Dakota | | 5 | | | | | |
| Nebraska | | 8 | | | | | 1 |
| Kansas | | 33 | | | | 23 | |
| **South Atlantic** | 1 | 203 | | | 4 | 209 | 14 |
| Delaware | | 2 | | | | | |
| Maryland | | 34 | | | | 7 | |
| District of Columbia | | 30 | | | | 15 | |
| Virginia | | 28 | | | 1 | 24 | 4 |
| West Virginia | | 32 | | | 1 | 33 | 2 |
| North Carolina | | 38 | | | | 54 | |
| South Carolina | | 2 | | | 1 | 4 | |
| Georgia | | 18 | | | 1 | 35 | 8 |
| Florida | 1 | [2] 19 | | | | 37 | |
| **East South Central** | | 100 | | | 5 | 150 | 25 |
| Kentucky | | 53 | | | 1 | 30 | 7 |
| Tennessee | | 37 | | | 1 | 24 | 11 |
| Alabama | | 9 | | | 1 | 60 | 5 |
| Mississippi | | 1 | | | 2 | 36 | 2 |
| **West South Central** | | 66 | | 4 | 17 | 365 | 58 |
| Arkansas | | 1 | | 1 | | 30 | 1 |
| Louisiana | | 8 | | | 2 | 3 | [3] 23 |
| Oklahoma | | 1 | | | 1 | 10 | 4 |
| Texas | | 56 | | 3 | 14 | 322 | 30 |
| **Mountain** | | 158 | | | 1 | 138 | 3 |
| Montana | | 9 | | | | 16 | 3 |
| Idaho | | 31 | | | | 3 | |
| Wyoming | | | | | | 8 | |
| Colorado | | 15 | | | 1 | 27 | |
| New Mexico | | 8 | | | | 16 | |
| Arizona | | 3 | | | | 62 | |
| Utah | | [2] 92 | | | | 5 | |
| Nevada | | | | | | 1 | |
| **Pacific** | | 249 | | | 9 | 55 | 4 |
| Washington | | 35 | | | | 14 | 3 |
| Oregon | | 8 | | | 1 | 4 | |
| California | | [2] 206 | | | 8 | 37 | 1 |
| Alaska | | 1 | | | | 2 | |
| Hawaii | | | | | | | |

[1] Including cases reported as salmonellosis.
[2] Including cases reported as streptococcal sore throat.
[3] Report for February.

# Communicable Disease Charts

*All reporting States, November 1950 through April 21, 1951*




The upper and lower broken lines represent the highest and lowest figures recorded for the corresponding weeks in the preceding 5 years. The solid line is a median figure for the preceding 5 years. All three lines have been smoothed by a 3-week moving average. The dots represent numbers of cases reported weekly, 1950–51.

# FOREIGN REPORTS

## CANADA

*Reported Cases of Certain Diseases—Week Ended Apr. 7, 1951*

| Disease | Total | New-found-land | Prince Edward Island | Nova Scotia | New Bruns-wick | Que-bec | On-tario | Mani-toba | Sas-katch-ewan | Al-berta | Brit-ish Co-lum-bia |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Brucellosis | 4 | | | | | 1 | 3 | | | | |
| Chickenpox | 937 | | | 27 | | 173 | 499 | 19 | 19 | 47 | 153 |
| Diphtheria | 3 | | | | | 3 | | | | | |
| Dysentery, bacillary | 8 | | | | | | | | | | |
| Encephalitis, infectious | 1 | | | | 1 | | | | | | |
| German measles | 421 | 3 | | 64 | | 60 | 207 | | 6 | 43 | 38 |
| Influenza | 666 | | | 50 | 14 | | 9 | 31 | 6 | | 556 |
| Measles | 1,613 | 4 | | 22 | | 237 | 1,067 | 134 | 12 | 78 | 59 |
| Meningitis, meningococcal | 8 | | | 1 | 1 | 1 | 1 | 1 | 1 | | 2 |
| Mumps | 1,045 | 6 | | 7 | | 266 | 389 | 54 | 53 | 120 | 150 |
| Poliomyelitis | 1 | | | | | 1 | | | | | |
| Scarlet fever | 264 | | | | | 102 | 54 | 16 | 7 | 40 | 45 |
| Tuberculosis (all forms) | 251 | 11 | | 5 | 13 | 107 | 19 | 16 | 7 | 22 | 51 |
| Typhoid and paratyphoid fever | 11 | | | | | 8 | 1 | | | | 2 |
| Venereal diseases: | | | | | | | | | | | |
| Gonorrhea | 263 | 4 | | 18 | 2 | 60 | 51 | 25 | 13 | 42 | 48 |
| Syphilis | 92 | 5 | | 12 | 3 | 23 | 25 | 3 | 7 | 3 | 11 |
| Primary | 6 | 1 | | | | 1 | 3 | | 1 | | |
| Secondary | 4 | | | | | 1 | 2 | | 1 | | |
| Other | 82 | 4 | | 12 | 3 | 21 | 20 | 3 | 5 | 3 | 11 |
| Other forms | 1 | | | | | | | | | | 1 |
| Whooping cough | 103 | 1 | | | 1 | 30 | 35 | 7 | 5 | 3 | 21 |

## JAMAICA

*Reported Cases of Certain Diseases—5 Weeks Ended Mar. 31, 1951*

| Disease | Total | Kingston | Other localities |
|---|---|---|---|
| Chickenpox | 175 | 16 | 159 |
| Diphtheria | 5 | 2 | 3 |
| Leprosy | 1 | | 1 |
| Meningitis, meningococcal | 1 | 1 | |
| Ophthalmia neonatorum | 2 | 1 | 1 |
| Puerperal sepsis | 3 | 1 | 2 |
| Scarlet fever | 1 | | 1 |
| Tuberculosis, pulmonary | 70 | 31 | 39 |
| Typhoid fever | 76 | 8 | 68 |
| Typhus fever (murine) | 1 | 1 | |

## REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

The following reports include only items of unusual incidence or of special interest and the occurrence of these diseases, except yellow fever, in localities which had not recently reported cases. All reports of yellow fever are published currently. A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

### Cholera

*Burma.* During the week ended April 14, 1951, 12 cases of cholera were reported in Bassein. This represents an increase from the five and eight cases reported, respectively, for the weeks ended March 31 and April 7. For the corresponding weeks Moulmein reported a decrease—from 38 cases for the week ended March 31 to 28 cases for the week ended April 14. Rangoon reported six cases of cholera for the week ended April 14—more cases than Rangoon has reported in any week this year.

### Plague

*Burma.* One imported case of plague was reported in Rangoon for the week ended April 14, 1951.

### Smallpox

*Belgian Congo.* For the week ended March 31, 1951, 121 cases of smallpox were reported in Belgian Congo.

*Ecuador.* During the period February 16–28, 1951, 47 cases of smallpox were reported in Ecuador as compared with 10 for the first half of the month.

*French West Africa.* The incidence of smallpox increased for the period March 21–31, 1951—from 118 cases in the previous 10-day period to 219. For the period March 21–31 smallpox was reported as follows: Dahomey, 13; Guinea, 2; Ivory Coast, 44; Niger Territory, 55; Senegal, 1; Upper Volta, 27; and Sudan, 77.

*Indochina.* During the week ended April 14, 1951, smallpox was reported in ports of Viet Nam as follows: Haiphong, 39 cases; Hanoi, 6; and Saigon, 2.

*Turkey.* During the period March 25–April 14, 32 cases of smallpox were reported in Ozalp, Province of Van.

### Typhus Fever

*Egypt.* For the week ended April 7, 1951, one case of typhus fever was reported in Cairo.

*Iraq.* One case of typhus fever was reported in Bagdad during the week ended April 14, 1951.

### Yellow Fever

*Ecuador.* One fatal case of jungle yellow fever was reported in Quininde, Esmeraldas Province, on March 21, 1951. The locality is outside the yellow fever endemic area as delineated by the World Health Organization.

## Examination for Sanitary Engineers

Competitive examinations for the appointment of officers as sanitary engineers in the Regular Commissioned Corps of the Public Health Service will be held in various cities throughout the country August 6, 7, and 8, 1951. The examination will include professional written tests, an oral interview, and a physical examination. Completed applications must be in the Washington office by July 9, 1951.

Appointments are permament and provide opportunities for career service in research and public health activities. Appointments will be made in the grades of assistant and senior assistant, equivalent to Navy ranks of lieutenant (j. g.) and lieutenant, respectively. Entrance pay for an officer with dependents is $4,486 in the assistant grade and $5,346 in the senior assistant grade, including rental and subsistence allowance. Applicants must have a bachelor's degree in engineering, preferably in civil, sanitary, or chemical engineering, and must complete by May 1952, a total of at least three additional years of professional training and experience. At least 2 years of the required experience must have been in public health or an acceptable related field.

For application forms and additional information write to: Surgeon General, Public Health Service, Federal Security Agency, Washington 25, D. C., Attention: Division of Commissioned Officers, Desk A.

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The printing of this publication has been approved by the Director of the Bureau of the Budget (August 10, 1949).

The PUBLIC HEALTH REPORTS, first published in 1878 under authority of an act of Congress of April 29 of that year, is issued weekly by the Public Health Service through the Division of Public Health Methods, pursuant to the following authority of law: United States Code, title 42, sections 241, 245, 247; title 44, section 220.

It contains (1) current information regarding the incidence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

The PUBLIC HEALTH REPORTS is published primarily for distribution, in accordance with the law, to health officers, members of boards or departments of health, and other persons directly or indirectly engaged in public health work. Articles of special interest are issued as reprints or as supplements, in which forms they are made available for more economical and general distribution.

Requests for and communications regarding the PUBLIC HEALTH REPORTS, reprints, or supplements should be addressed to the Surgeon General, Public Health Service, Washington 25, D. C. Subscribers should remit direct to the Superintendent of Documents, Washington 25, D. C.

Librarians and others should preserve their copies for binding, as the Public Health Service is unable to supply the general demand for bound copies. Indexes will be supplied upon request.

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# Public Health Reports

VOLUME 66 **MAY 18, 1951** NUMBER 20

IN THIS ISSUE



FEDERAL SECURITY AGENCY

PUBLIC HEALTH SERVICE

**FEDERAL SECURITY AGENCY**

***Oscar R. Ewing, Administrator***

**PUBLIC HEALTH SERVICE**

***Leonard A. Scheele, Surgeon General***

**Division of Public Health Methods**

***G. St. J. Perrott, Chief of Division***

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Public Health Reports

*Vol. 66* • MAY 18, 1951 • *No. 20*

# Activities of Medical Administrators in State Health Departments

By Harald M. Graning, M.D., M.P.H., Marion Ferguson, R.N., Ph.D., Bess A. Cheney, M.A., and Anne M. Leffingwell, B.N., M.S.*

The Nation today is facing a major manpower shortage in the field of public health. One of the acute problems is that of meeting the increasing demands for public health trained medical personnel to fill administrative positions. The prevailing shortages in State and local areas will be accentuated by the responsibilities for civil defense preparation, the needs of the military, and the Point IV program. As public health workers, we are concerned with the development of optimum health services for all population groups on a Nation-wide scale. Factors involved in the attainment of this objective include increasing the number of public health trained physicians and the maximum utilization and integration of qualified medical personnel now in State and local health jurisdictions.

The present study was undertaken to obtain information from medical administrative personnel in State health departments as to their duties and responsibilities. It also proposed to ascertain, if possible, what activities now performed by medical administrators require medical skills.

By studying the various activities in connection with all kinds of public health programs, it was hoped to learn (1) ways in which the skills and knowledge possessed by medically trained persons could be utilized more productively; (2) areas of operation in which administrative assistants without medical training could supplement and extend the fields of operation of the medically trained administrator, thus releasing him from administrative responsibilities not requiring medical training. The delegation of nonmedical administrative duties to well-prepared administrative assistants might have far-reaching implications in the attainment of more and better public health services despite the acute shortages of physicians.

*Chief, State and Local Health Services Branch; Chief, Studies and Demonstrations Section; Methods Examiner; and Nurse Officer, Division of State Grants, Public Health Service, Washington, D. C. Based on a report delivered by Sr. Surgeon Harald M. Graning before the Health Officers Section at the Annual Meeting of the American Public Health Association, St. Louis, Mo., Oct. 31, 1950. This is one of a series of studies on activities of medical personnel in administrative positions in State and local health departments.

## Distribution of Participants

In order to learn what medical personnel in administrative positions in State health departments do from day to day, medical State health officers and medical personnel in administrative positions in all State health departments were invited to participate in the study.

One hundred and seventy-three persons in medical administrative positions [1] in 34 States volunteered to submit detailed reports for one week during December 1949 or January 1950. The participants are to be commended for the excellent way in which they responded and for the meticulous manner in which they filled out the reports. Out of 10,838 activities reported in the study, only 22 could not be identified. This speaks exceedingly well for the importance which the physicians attached to this study, made possible only because they were willing to contribute their time and to give careful attention to the detail involved.

Since participation in the study was voluntary, the geographic distribution of respondents was in no way predetermined. The map (fig. 1) showing Federal Security Agency Regions indicates a satisfactory sample from every region, although 14 States scattered throughout the country were not represented. For the country as a whole, 45 percent of the 343 physicians in administrative positions in State health departments participated in the study. The percentages

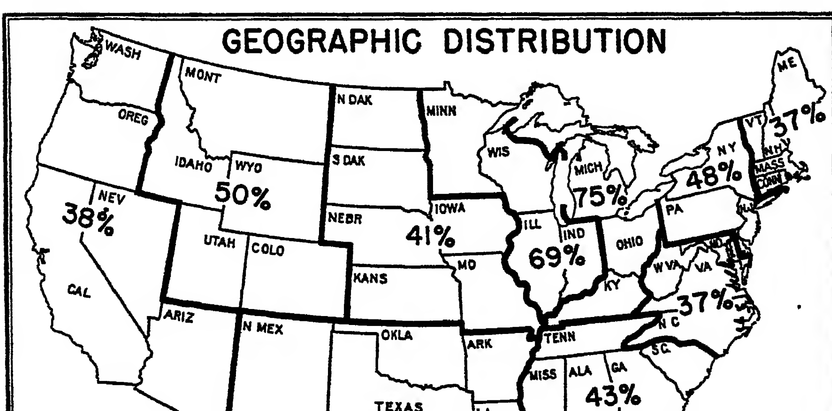


Figure 1. Geographic distribution by Federal Security Agency Regions, showing the percentage of medical personnel in administrative positions in State health departments who participated in the study of activities of medical administrative personnel during December 1949 or January 1950.

[1] This includes five dentists.

range from 21 percent in Region VIII to 75 percent in Region IV. All of the regions except one had a response of 32 percent or more.

Examination of the programs represented in the study shows a fairly complete coverage of the major divisions usually functioning in State health departments. The medical personnel in administrative positions in State health departments participating in the study have been grouped into the following 14 categories:

| *Category* | *Number of participants* |
|---|---|
| Total | 173 |
| Maternal and child health and crippled children | 23 |
| Local health administration | 21 |
| Tuberculosis | 20 |
| Venereal diseases | 19 |
| Communicable diseases | 17 |
| District health officers | 15 |
| Chronic diseases | 14 |
| Laboratory | 12 |
| State health officers and assistant State health officers | 10 |
| Industrial hygiene | 7 |
| Dental services | 5 |
| Mental health | 4 |
| Hospital services | 3 |
| Special services | 3 |

NOTE: These data and those in succeeding charts and tables were obtained from the replies of respondents who recorded their activities for either one week in December 1949 or in January 1950.

## Method of Study

The data was collected through the use of a relatively simple daily report form on which each participant in the study noted in code what he did, how long it took to the nearest 5 minutes, and whether or not in his opinion the activity involved medical judgment. All time reported, except the time definitely identified as not connected with health department duties, was included in the tabulations. Records have been tabulated as submitted except that the end of one activity was considered to mark the beginning of the next, and the time was so computed.

## Results of Study

This report presents the results of analyses of what the participating medical administrators reported as their activities for one work week. A summary of the basic data as to time and occurrence of activities and programs is shown in tables 1 and 2.

Although the recording of time by program and activity represents fact, the expression by participants as to whether medical judgment was or was not involved represents opinion. It is this *opinion* which is truly significant, since the medical administrator will determine the responsibilities to be assigned to nonmedical administrative personnel.

Table 1. *Amount of time in minutes and frequency of occurrence, according to total time and occurrence and according to the utilization of medical judgment, reported for activities by medical personnel in administrative positions in State health departments for 1 week during December 1949 or January 1950*

| Activity | Total | | Medical judgment | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | Involved | | Not involved | | Not specified | |
| | Occurrences | Time | Occurrences | Time | Occurrences | Time | Occurrences | Time |
| All activities | 10,838 | 442,705 | 7,423 | 311,140 | 3,204 | 115,185 | 211 | 16,380 |
| Direction and supervision | 576 | 18,350 | 438 | 13,990 | 132 | 4,290 | 6 | 70 |
| Personnel | 321 | 9,900 | 140 | 5,065 | 181 | 4,835 | | |
| Program planning | 783 | 34,210 | 673 | 29,920 | 108 | 4,240 | 2 | 50 |
| Budget and fiscal | 266 | 8,555 | 108 | 4,000 | 158 | 4,555 | | |
| Enforcement of ordinances | 49 | 2,760 | 37 | 2,370 | 12 | 390 | | |
| Licensing | 30 | 1,540 | 16 | 1,135 | 14 | 405 | | |
| Authorization for hospitalization | 69 | 2,360 | 61 | 2,050 | 8 | 310 | | |
| Correspondence | 1,583 | 53,330 | 1,255 | 44,370 | 327 | 8,935 | 1 | 25 |
| Telephone | 1,430 | 13,345 | 933 | 9,005 | 492 | 4,280 | 5 | 60 |
| Records and reports | 729 | 28,205 | 506 | 20,700 | 218 | 7,335 | 5 | 170 |
| Board or committee participation | 78 | 7,635 | 64 | 6,675 | 13 | 900 | 1 | 60 |
| Meetings attended | 88 | 10,560 | 66 | 8,215 | 22 | 2,345 | | |
| Conferences, individual | 1,480 | 47,280 | 1,123 | 38,125 | 355 | 9,115 | 2 | 40 |
| Conferences, group | 611 | 43,630 | 485 | 36,145 | 125 | 7,395 | 1 | 90 |
| Community activity | 94 | 5,505 | 57 | 3,585 | 34 | 1,530 | 3 | 390 |
| Talks given | 56 | 4,405 | 52 | 4,270 | 4 | 135 | | |
| Education-in-service | 118 | 8,080 | 89 | 6,055 | 29 | 2,025 | | |
| Teaching—formal | 38 | 3,260 | 36 | 2,990 | 2 | 270 | | |
| Self-improvement | 355 | 13,390 | 275 | 10,570 | 76 | 2,710 | 4 | 110 |
| Preparation of educational material | 275 | 13,580 | 234 | 11,555 | 41 | 2,025 | | |
| Field investigations | 51 | 6,420 | 43 | 6,025 | 7 | 335 | 1 | 60 |
| Evaluations and surveys | 181 | 9,625 | 147 | 8,390 | 31 | 1,130 | 3 | 105 |
| Clinic participation | 166 | 13,560 | 165 | 13,545 | 1 | 15 | | |
| Consultation service | 136 | 4,890 | 135 | 4,875 | 1 | 15 | | |
| Purchasing | 76 | 1,975 | 25 | 795 | 49 | 1,105 | 2 | 75 |
| Housekeeping and errands | 65 | 1,640 | 8 | 370 | 56 | 1,220 | 1 | 50 |
| Travel | 725 | 56,430 | 80 | 7,675 | 544 | 39,160 | 101 | 9,595 |
| Personal | 196 | 4,225 | 15 | 255 | 124 | 2,780 | 57 | 1,190 |
| Laboratory specimens | 33 | 1,830 | 15 | 1,000 | 18 | 830 | | |
| Legislation | 11 | 525 | 7 | 420 | 4 | 105 | | |
| Film interpretation | 104 | 4,960 | 104 | 4,960 | | | | |
| Hospital plans | 5 | 300 | 5 | 300 | | | | |
| Checking and supervising equipment | 7 | 135 | 2 | 60 | 5 | 75 | | |
| Unavoidable delay | 15 | 340 | 12 | 190 | 2 | 110 | 1 | 40 |
| Research | 4 | 720 | 4 | 720 | | | | |
| Leave—annual or sick | 11 | 4,120 | | | | | 11 | 4,120 |
| Tuberculin testing | 3 | 255 | 3 | 255 | | | | |
| Unspecified | 20 | 875 | 5 | 515 | 11 | 280 | 4 | 80 |

Time for all activities reported by the 173 medical personnel in administrative positions in State health departments amounted to a total of 442,705 minutes. This represented 10,838 individual occurrences of activity, an average of 41 minutes for each occurrence (table 1). Included in the total of 442,705 minutes are travel, personal, and leave time, and a small amount of unidentified time. Of the total time reported, 311,140 minutes were recorded in which medical judgment was involved—an average of 42 minutes for each occurrence. For activities in which the respondents stated that medical judgment was not involved, 115,185 minutes were reported

with an average time of 36 minutes per occurrence; and for 16,380 minutes for which the involvement of medical judgment was not specified, the average was 78 minutes for each occurrence.

Omission of the items of leave, personal time, travel time, and unidentified time reduces the total time of 442,705 minutes to 377,055 and the number of occurrences from 10,838 to 9,886. The minutes for each occurrence are but slightly altered in the activities involving medical judgment—the average time is 41 minutes for each occurrence. Those not involving medical judgment and the group for which the involvement of medical judgment was not specified are changed to 29 minutes and 37 minutes, respectively.

In terms of percentage, figure 2 shows that 70 percent of the time and 68 percent of the occurrences reported in the study involved medical judgment; 26 percent of the time and 30 percent of the occurrences did not involve medical judgment. Medical judgment was not specified for 4 percent of the time and 2 percent of the occurrences.

Total time reported for travel was 56,430 minutes, or 13 percent, of all time reported. This represented the greatest amount of time devoted to a single activity.

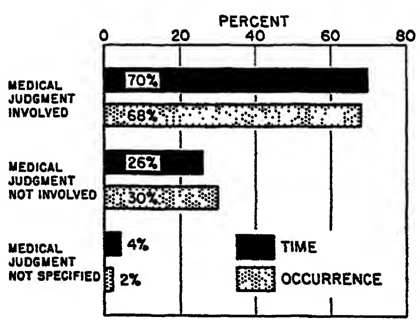


Figure 2. Activities reported by medical personnel in administrative positions in State health departments, by percentage of time required and by percentage of occurrences.

## *Programs*

Reports from medical personnel indicated activities in 39 programs, 9 of which were reported fewer than 20 times each (table 2). Of the total of 442,705 minutes, 122,850 minutes were recorded in the general category which includes activities that affected more than one program. Of the specific programs, tuberculosis led with 53,310 minutes. Next in line were venereal disease with 38,330 minutes; laboratory, 26,450 minutes; other communicable diseases, 25,520 minutes; and cancer, 22,420. The general program represented 28 percent of the total time, and the five specific programs, 37 percent, totaling 65 percent of all time reported for the six programs.

Table 2. *Amount of time in minutes and frequency of occurrence, according to total time and occurrence and according to the utilization of medical judgment, reported for program operations by medical personnel in administrative positions in State health departments for 1 week during December 1949 or January 1950*

| Program | Total | | Medical judgment | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | Involved | | Not involved | | Not specified | |
| | Occurrences | Time | Occurrences | Time | Occurrences | Time | Occurrences | Time |
| All programs | 10,838 | 442,705 | 7,423 | 311,140 | 3,204 | 115,185 | 211 | 16,380 |
| General | 2,661 | 122,850 | 1,719 | 80,705 | 882 | 35,105 | 60 | 7,040 |
| Tuberculosis | 1,456 | 53,310 | 1,093 | 41,065 | 355 | 11,725 | 8 | 520 |
| Venereal diseases | 848 | 38,330 | 616 | 28,325 | 213 | 7,890 | 19 | 2,115 |
| Other communicable diseases | 626 | 22,520 | 527 | 17,560 | 91 | 4,445 | 8 | 515 |
| Maternity | 170 | 5,230 | 141 | 4,635 | 28 | 580 | 1 | 15 |
| Infant and preschool | 232 | 9,070 | 196 | 8,150 | 36 | 920 | -------- | -------- |
| School | 213 | 12,305 | 159 | 8,675 | 54 | 3,630 | -------- | -------- |
| Crippled children | 370 | 16,940 | 252 | 12,530 | 104 | 3,650 | 14 | 760 |
| Dental | 225 | 10,525 | 147 | 7,510 | 71 | 2,605 | 7 | 410 |
| Nutrition | 129 | 4,840 | 93 | 3,600 | 30 | 1,140 | 6 | 100 |
| Heart | 147 | 6,750 | 105 | 5,095 | 41 | 1,610 | 1 | 45 |
| Diabetes | 77 | 3,075 | 60 | 2,635 | 16 | 420 | 1 | 20 |
| Cancer | 597 | 22,420 | 403 | 16,065 | 192 | 6,300 | 2 | 55 |
| Mental health | 288 | 10,865 | 191 | 7,995 | 97 | 2,870 | -------- | -------- |
| Medical care | 104 | 3,260 | 86 | 2,695 | 17 | 545 | 1 | 20 |
| Industrial hygiene | 579 | 16,265 | 450 | 13,030 | 128 | 3,215 | 1 | 20 |
| Milk and food sanitation | 65 | 2,525 | 45 | 1,805 | 19 | 700 | 1 | 20 |
| Water and sewage | 51 | 1,170 | 16 | 555 | 32 | 580 | 3 | 35 |
| Rodent and insect control | 19 | 440 | 9 | 235 | 10 | 205 | -------- | -------- |
| Other environmental health programs | 76 | 2,650 | 30 | 1,160 | 45 | 1,470 | 1 | 20 |
| Accident prevention | 12 | 540 | 8 | 375 | 4 | 165 | -------- | -------- |
| Laboratory | 704 | 26,450 | 381 | 15,655 | 317 | 10,680 | 6 | 115 |
| Public health statistics | 113 | 4,890 | 74 | 3,505 | 38 | 1,355 | 1 | 30 |
| Hospital facilities | 362 | 16,095 | 232 | 11,370 | 125 | 4,415 | 5 | 310 |
| Housing | 17 | 680 | 5 | 200 | 12 | 480 | -------- | -------- |
| Chronic diseases | 32 | 2,225 | 21 | 755 | 11 | 1,470 | -------- | -------- |
| Geriatrics | 3 | 85 | 3 | 85 | -------- | -------- | -------- | -------- |
| Local health services | 171 | 6,955 | 118 | 4,970 | 51 | 1,625 | 2 | 360 |
| Preventive medicine | 18 | 1,005 | 16 | 945 | 2 | 60 | -------- | -------- |
| Drug and narcotic control | 9 | 470 | 4 | 220 | 5 | 250 | -------- | -------- |
| Licensure divisions | 22 | 1,030 | 9 | 480 | 13 | 550 | -------- | -------- |
| Disasters and emergencies | 28 | 525 | 15 | 295 | 13 | 230 | -------- | -------- |
| Personal | 155 | 5,260 | 8 | 120 | 91 | 2,090 | 56 | 3,050 |
| Multiple screening | 2 | 180 | 1 | 120 | 1 | 60 | -------- | -------- |
| Maternal and child health | 203 | 8,545 | 163 | 7,020 | 39 | 1,460 | 1 | 65 |
| General sanitation | 25 | 1,800 | 17 | 825 | 6 | 315 | 2 | 660 |
| Training | 22 | 420 | 10 | 175 | 12 | 245 | -------- | -------- |
| Vocational rehabilitation | 1 | 60 | -------- | -------- | 1 | 60 | -------- | -------- |
| Unspecified | 6 | 150 | -------- | -------- | 2 | 70 | 4 | 80 |

Reports of the medical directors varied widely on the extent to which medical judgment was involved. This was true both for types of programs and for percentages of total time per program. When all programs are considered, medical judgment was involved 70 percent of the time.

The 13 programs representing the greatest total time and the extent to which medical judgment was involved in each of the programs are shown in figure 3. These programs were also among those having the greatest number of occurrences. The participants reported that

SELECTED PROGRAMS INVOLVING MEDICAL JUDGMENT

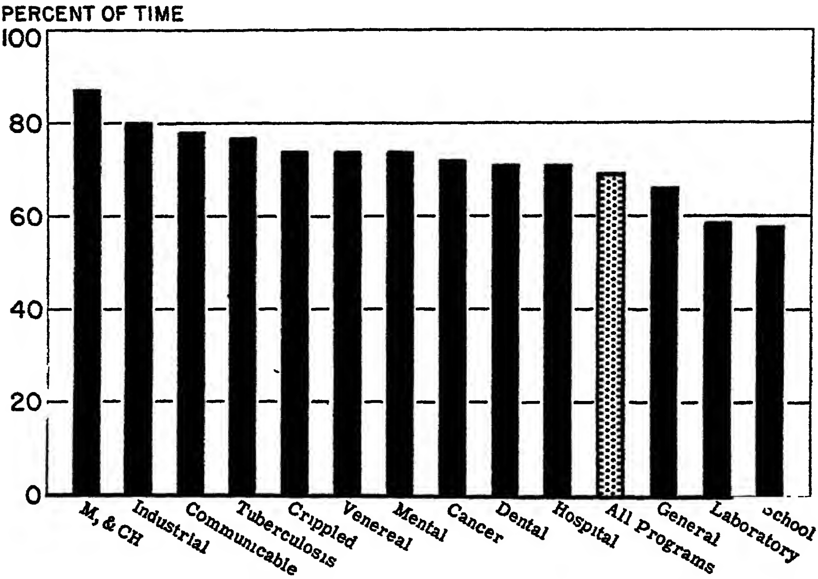


Figure 3. Percentage of time involving medical judgment spent in selected programs as reported by medical personnel in administrative positions in State health departments who participated in the study of activities.

87 percent of the time spent in maternal and child health, exclusive of the crippled children's services, involved medical judgment; industrial hygiene showed 80 percent, communicable diseases 78 percent, and the tuberculosis program 77 percent. The six programs next in order, crippled children, venereal diseases, mental health, cancer, dental health, and hospital facilities, range from 74 percent to 71 percent. The general program, which leads in number of activities and total time, ranks eleventh in percentage of time which involved medical judgment. A few programs showed a higher percentage of time in which medical judgment was involved, but too few occurrences were reported to justify their inclusion.

In many areas of service and in States where personnel is limited, the available medical administrative personnel may carry responsibility for more than one operating program. With the trend toward generalization of public health activities, a broad basic knowledge and awareness of all services is advantageous. An analysis was made to determine to what extent the activities of division directors cut across fields other than those of their specialties. Figure 4 indicates the type of programs in which medical personnel in administrative positions reported some participation during the study.

The detailed analysis revealed that State health officers, directors of local health administration, district health officers, and directors


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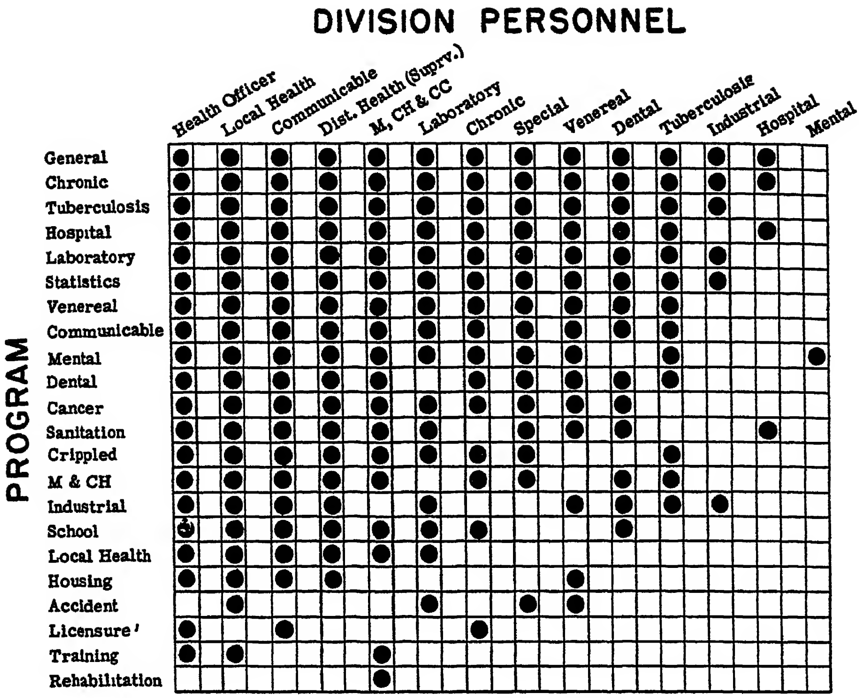


**Figure 4.** Types of programs in which medical personnel in administrative positions in State health departments reported participation during one week in December 1949 or January 1950.

of special services reported activities in almost every program. Analysis of the remaining 10 categorical programs revealed that 62 percent of the time in these programs was spent in the special field represented, while 38 percent was distributed over the various remaining programs. Any activity that concerned more than one program was reported under general. Sixteen percent of the time of these 10 divisions was reported in this category. If this general time is considered to relate primarily to the categorical program, it would still leave 22 percent of the time in which directors of categorical programs were involved in other than their own specialties. The directors of mental health reported that all their time was spent on mental health; directors of tuberculosis reported 90 percent of their time in the tuberculosis program; directors of industrial hygiene reported that 89 percent of their time was spent in their own field; laboratory directors reported that 85 percent of their time was devoted to laboratory programs, and maternal and child health and crippled children directors worked in their own specialties 55 percent of their time.

*Activities*

Activities, which for the purpose of this study are the components

of operating programs, have been tabulated with reference to time and occurrence. Thirty-eight specific activities occurred 10,838 times. The most frequently reported activity was handling correspondence, which occurred 1,583 times. Individual conferences were next, being reported 1,480 times, followed by telephone with 1,430. These three activities represent 41 percent of the total number of reported occurrences for all activities. The three next highest were program planning, occurring 783 times, records and reports with 729 occurrences, and travel with 725. Together with the three highest, these six activities include 62 percent of all occurrences (table 1).

The greatest amount of time reported for a single activity was 56,430 minutes for travel. Handling correspondence was second with 53,330 minutes. One activity, research, was recorded four times with a total of 720 minutes reported, or an average of 180 minutes for each occurrence. This was the greatest average time for any activity. The second highest in average time was field investigations with 126 minutes for 51 occurrences, totaling 6,420 minutes. The total time reported for the five activities, travel, handling correspondence, individual conferences, group conferences and program planning, represented more than half of the total time reported. If the seven activities reporting the next highest amounts of time, namely, records and reports, direction and supervision, preparation of educational materials, clinic participation, self-improvement, telephone, and meetings attended are added, these 12 account for 78 percent of the total time reported for all activities.

When activities are considered with reference to the amount of time in which medical judgment is or is not involved, there are four for which all time reported was considered by the participants to involve medical judgment. These are film interpretation, hospital plans and specifications, research, and tuberculin testing. Participants in the study reported also that essentially all time for clinic participation and professional consultation involved medical judgment. Next in order of rank are talks given with 97 percent, field investigations with 94 percent, and formal teaching with 92 percent of the time reported as involving medical judgment.

Figure 5 shows the percentage of time that involved medical judgment as reported for selected activities, the average for all being 70 percent. In this grouping, 87 percent of the time for program planning and 85 percent of the time spent in preparation of educational materials involved medical judgment, as did 83 percent of both group conference time and correspondence; 79 percent of the time spent for self-improvement, 76 percent for direction and supervision, and 67 percent for telephone were recorded as involving medical judgment.

All activities reported involved some medical judgment. Seventy-

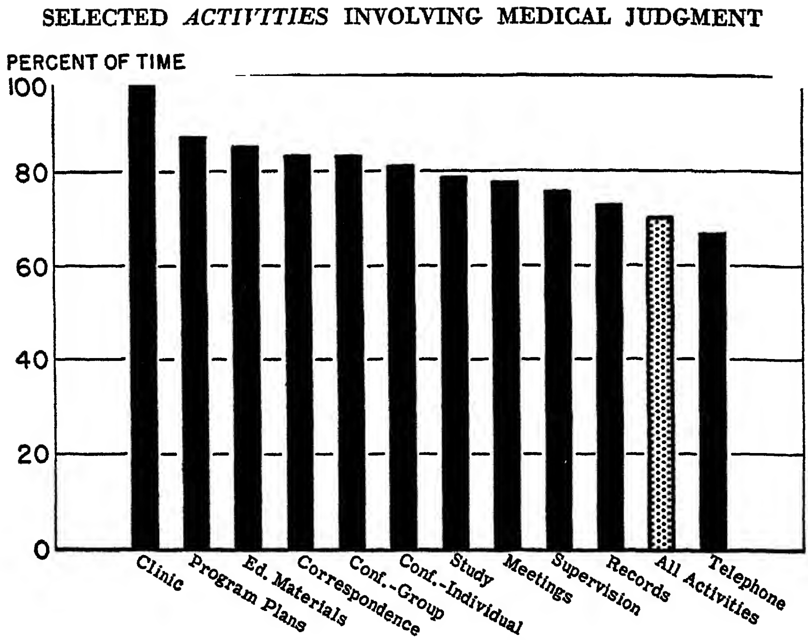


**Figure 5. Percentage of time involving medical judgment spent in selected activities as reported by medical personnel in administrative positions in State health departments participating in the study of activities.**

four percent of the time spent on housing did not involve medical judgment; travel time was second with 69 percent; purchasing was next with 56 percent, and checking or supervising equipment also took 56 percent of the time.

When the activities reported as not involving medical judgment are considered (exclusive of travel and personal time), nine activities account for 76 percent of the time so reported; 13 percent was spent on individual conferences; 12 percent on correspondence; 10 percent on group conferences; and 10 percent on records and reports. Seven percent of this time was spent on personnel activities and 6 percent each on budget and fiscal, telephone, program planning, and the direction and supervision of personnel.

## Summary

This study of the programs and activities conducted by 173 medical administrative personnel in State health departments is the first of its kind ever reported. It has been made possible through the conscientious and unstinting cooperation of the participating State health departments and their medical personnel.

On the basis of the fairly comprehensive list of activities carried on by the reporting medical administrative personnel and the determina-

tion by the respondents of those activities which involved medical judgment, information has been made available which should be useful in the construction and review of curricula offered medical public health personnel in schools of public health. It should be of value not only in administrative, personnel, and program planning operations in departments themselves, but also in the fields of recruitment and placement, orientation and training, review of job specifications for positions already established, and the preparation for positions being planned in both general and specialized programs. The information should also be useful in determining not only what kinds of academic preparation would be desirable, but also what kinds of experience in public health work would seem to be most suitable.

The data revealed that medical administrative personnel in public health spend appreciable amounts of time in programs other than their own, even when their own is in a well-defined and well-organized special field for which the disciplines, duties, and responsibilities have long been established. It appears therefore that the traditional concept that categorical program division directors get experience in but one field needs revision.

Although the results of the study do not point to any single activity or group of activities which can be definitely marked as suitable under all circumstances for delegation to nonmedical adminstrative assistants, it is evident that there are certain types of activities which were frequently considered as not involving medical judgment. The delegation of such activities to competent nonmedical administrative personnel would in some instances involve the employment of such personnel. On the other hand, examination of the resources of a department might disclose that these duties could be assigned to persons already employed. It might also be found that by pooling certain activities in which medical judgment is not involved, as now carried on by several medical administrators, there would be a full-time position which would warrant the addition of a well-trained nonmedical administrative assistant.

The maximum utilization of the assistance of nonmedical administrative personnel is necessarily dependent upon their availability and competence. The activities reported as not involving medical judgment should serve as guides in planning the recruitment and training of nonmedical administrative personnel.

Postgraduate schools might well consider the potential market for trained nonmedical administrative personnel, for State health departments are but one group that might profitably employ them.

If physicians could be relieved of the administrative details which do not involve medical judgment, it would serve to stretch available medical manpower and would make public health careers more attractive to physicians.

# Nutrition and the Control of Chronic Disease

## —Public Health Aspects—

By Richard W. Vilter, M.D., and Carl Thompson, M.D.*

The greatness and stability of this Nation and of the world depend upon the high productive capacity of its people. Good health—both mental and physical—is essential in order that people may work efficiently and happily and enjoy the fruits of their labors. The science of medicine has done much to control infectious diseases, although morbidity and mortality from virus diseases still remain a problem. Medicine and its allied sciences have increased greatly the age expectancy of the child and to a lesser extent of the adult. Life has been prolonged far beyond the expectations of 50 years ago, but many times disease has made such inroads upon the person that he is incapable any longer of making a contribution to society.

Only too frequently life has been prolonged without health or happiness, and a chronically ill person finds that he is dependent upon his more productive fellows for his very existence. At least one-third of the time that chronic illness strikes it leads to incapacity during the fourth to sixth decades of life which, in our society, should be man's most productive years. The prevention and control of disabling chronic diseases such as arteriosclerosis, vascular hypertension, cancer, arthritis, diabetes mellitus and other metabolic disorders, chronic infections, and degenerative kidney and liver diseases have become a major challenge to the medical profession and health agencies.

The approach to these problems is complicated by the fact that these diseases are of unknown etiology. Hereditary factors are very important, but by and large the occurrence of these diseases is governed by the life habits of the people affected. If nutrition plays a role, it does so through indirect channels. A possible relationship of nutrition to diseases which have hereditary features is described in the Concept of the Genetotrophic Disease (*1*). Such a disease may occur if a diet fails to provide a sufficient supply of one or more nutrients required in large amounts because of the characteristic genetic pattern of the individual concerned. There is a considerable body of evidence suggesting that the common degenerative diseases may be of this type and that nutritional factors may play a role in their genesis (*2*). A person may be born with the capacity to carry on certain metabolic reactions only when a very

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large amount of one or more nutrients is available—an amount much greater than that which usually is found in an "adequate diet." If this large amount is not available, the metabolism of cells and tissues suffers over a number of years. Depending on the type of metabolic defect, one or more of the chronic diseases may appear at a relatively early age. If the nutrient is provided by artificial means in the required amounts, the metabolic defect may have no serious consequence.

If habits of living are important in determining whether chronic diseases develop, then nutrition again enters the picture. One of the most tenacious of such habits has to do with the selection of food and way of eating. This habit is formed in infancy and childhood and may at this early age lay the foundation for good or ill health.

Although the etiologic relationship of malnutrition to these chronic diseases is still highly theoretical, adequate nutrition may play a considerable role in preventing their appearance, delaying their onset, and slowing their course. The preventive aspects of adequate nutrition on chronic disease are in many instances clearly established and of very real importance. The maintenance of adequate nutrition in the face of chronic disease can do much to slow the progress of the disease and preserve a certain amount of self-sufficiency in those people who have a chronic disease. Basic research is demonstrating that the science of nutrition may have even more fundamental bearing on the problem, but this science has yet to define the full meaning of the term "adequate diet." The question may rightly be asked "Adequate for what?" It is possible that a diet adequate for growth and development or for the reparative stage following injury or illness may actually be overabundant for the healthy adult.

Only a beginning has been made in the study of the impact of nutrition on chronic disease, but it is imperative that those responsible for guarding the public health make use of and disseminate whatever knowledge is available and stimulate research along these lines (*3*). For this reason, we are recounting what is known about this subject and suggesting avenues for investigation which would appear to be most logical.

## Prevention Through Adequate Nutrition

It is well known that obesity and undernutrition (in calories or in essential nutrients) may predispose to certain chronic diseases and accelerate their course. Obesity, which in the great majority of cases is due to overeating and a sedentary life (*4*), places an excessive load upon carbohydrate metabolism and frequently precipitates the appearance of diabetes mellitus and accelerates its course. Obesity also places an excessive load upon the cardiovascular system and, through this strain, may accentuate hypertension and accelerate the

appearance of arteriosclerosis. Excessive weight, which must be borne by the large joints of the body, accelerates the appearance of hypertrophic arthritis and adds to the suffering of the patient who has rheumatoid arthritis. It also greatly increases the difficulties and dangers of surgical operations, yet it exerts a positive influence on the occurrence of cholelithiasis and cholecystitis, two major indications for surgery. Obesity may precipitate the appearance of abdominal and diaphragmatic hernias and, by increasing clumsiness, may make persons accident prone. Obesity is a considerable hazard to good health, and, because it is so common it has a very great bearing on the incidence of chronic disease.

Obesity is always due to intake of food in excess of energy output. Once a person has become obese, he will remain so as long as energy intake and output balance. Constitutional factors which have to do with the efficiency of the human body as a machine may increase the ease of weight gain, although the existence of such factors is denied by many competent investigators and experimental evidence of their importance is still lacking. Endocrine factors rarely play a part. When they do, they have their effect through an increase in appetite, and there are many other florid signs of endocrinopathy. Factors which tend to lead people into the habit of overeating are of utmost importance. They are most often psychological.

In order to control obesity, instruction in the correct selection of foods and in the value of controlled exercise is imperative. A reduction in caloric food intake below caloric energy output for any given period of time is essential. Usually, a 1,200 calorie diet adequate in protein, vitamins, and minerals will suffice for a moderately active person; a sedentary person may need to be put on a 1,000 or 800 calorie diet. From the public health point of view, it may be necessary to change the food habits of general population groups in order to bring about general weight reduction. Improvement in mental health is almost always necessary, for often the obese person overeats as a substitute for normal pleasures and gratifications which are lacking. Oral gratification—one of the earliest pleasures of infancy—is difficult to combat and frequently the entire life situation of the patient must be improved before reduction in weight can be accomplished, or once accomplished, can be maintained.

Twenty-five to 30 percent of adult persons in the United States are obese. The percentage may reach as high as 60 percent in women of the 50- to 70-year age group. The death rates of persons over 45 years of age who are 10 to 90 pounds overweight are, respectively, 8 percent to 116 percent greater than those in persons of normal weight. The incidence of diabetes mellitus is two and one-half times as great and cardiovascular-renal disease one and one-half times as great in the obese as in those of average weight (*5*, *6*). A

public health campaign might well be directed against this very real threat to the national well-being. Mass psychology might work where individual doctors fail.

Excessive leanness, or underweight, due to caloric restriction, although protective from some of the chronic diseases previously listed, nevertheless is a hazard because it predisposes to pulmonary tuberculosis and other chronic lung diseases. Rats on diets very low in calories but adequate in protein, vitamins, and minerals may live much longer than rats which receive a complete diet (*7, 8*). The life span of human beings has never been prolonged by such means because acute and chronic infections take their toll before even the normal life span has been reached. Anorexia nervosa, a most excessive form of weight loss due to loss of appetite on emotional grounds, may induce serious disability in the osseous, endocrine, ocular, and vasomotor systems which cannot be completely repaired even though the underlying psychiatric problems are solved and weight is regained.

Severe deficiencies in specific essential nutrients have accounted for much chronic illness in the past. Mild, subclinical deficiency states are still very numerous, even though such full-blown deficiency diseases as pellagra, beri-beri, and scurvy have been all but eliminated by extensive educational campaigns, by improvement in the standard of living of the lower income groups, and by such public health measures as the enrichment of white flour with essential nutrients previously removed during the milling process. The incidence of these illnesses and the effect on the health of the general population is still unknown, but it is probable that such mild deficiencies account for a great deal of chronic mental and physical ill health.

Certain possible effects of such chronic mild deficiencies may be pointed out. The deleterious effect on the gums of chronic deficiencies of the vitamins of the B complex and of vitamin C may predispose to infection and to pyorrhea, and therefore early loss of teeth. Chronic deficiencies of niacin, folic acid, or vitamin B-12 predispose to chronic atrophy of the mucous membranes of the tongue and upper gastrointestinal tract, particularly the stomach. This condition may lead to leukoplakia of the tongue and atrophic gastritis, both of which are precursors of neoplasms.

Deficiencies or dietary imbalances in iron, folic acid, vitamin B-12, vitamin C, and other related substances are the most important known factors in the development of nutritional anemias. Inadequacy in protein intake may also be important in this regard. Deficiencies of trace elements, particularly of iodine, also are important. The effect of dietary iodine on the incidence of endemic goiter is well known, and abnormalities in thyroid metabolism may be the direct result of iodine lack.

Finally, excesses of certain substances may also be injurious to good


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health and precursors of chronic illness or physical defect. The ingestion of excessive carbohydrate, causing stimulation of the activities of certain lactobacilli in the mouth, may be one of the factors responsible for excessive decay of teeth, just as deficiency of fluoride may injure the tooth structure. Excess of alcohol in beverage form replacing the calories of vitamin rich foods is one of the chief etiologic factors in the development of severe deficiency diseases today. It is also an important factor in the development of nutritional cirrhosis, which in turn may be a precursor of carcinoma of the liver. Excess of alcohol in a person deficient in thiamin and perhaps in vitamin B-12 may lead to severe peripheral neuritis which can account for long periods of pain and disability. Thus, too much or too little food or its component nutrilites may interfere seriously with good health and may predispose to and accelerate the course of chronic illness.

It is of paramount importance that attention be directed to the nutrition of expectant mothers, for the nutrition of the mother largely determines the good health and general resistance of the child at birth. Unless nutritional inadequacies engendered in utero are made up rapidly after birth, the growth and development of the child may be impaired and he may become subject to chronic illnesses which impair his efficiency for the rest of his life.

Another instance wherein an ounce of prevention is worth a pound of cure is in the management of acute infectious hepatitis and homologous serum hepatitis. In each such instance, rest and a high protein, high carbohydrate diet rich in essential nutrients will do a great deal to prevent the occurrence of chronic hepatitis and post-necrotic cirrhosis.

## Care and Rehabilitation of Persons With Chronic Disease

Persons with chronic disease whether at home or in institutions can be benefited by an adequate nutritious diet served in a palatable fashion (*9, 10*). Such a diet should be divided into three small meals a day supplemented with three interval feedings of milk, eggnog, or fruit juices. One or two ounces of a protein hydrolysate may be added to the milk or eggnog. Anorexia will be counteracted; strength, morale, and appetite will be improved, and the patient's energetic cooperation in physical rehabilitation methods will be gained.

Those with diabetes mellitus will be more able and willing to control their disease if they are given a diet which will bring them to normal weight for height. With the help of insulin, they will then be able to eat essentially the same type of meals as their friends and fellow workers. Whether the urine contains small amounts of sugar at any particular time is relatively unimportant.

The patient with chronic congestive heart failure can be greatly

improved if his diet contains one gram or somewhat less of sodium per day and is high in protein and other essential nutrients. The emphasis should be on small feedings and upon maintenance of a normal or slightly lower than normal weight. Patients with rheumatoid arthritis and hypertrophic arthritis will usually improve with rest and a diet which reduces weight to a normal level for height and yet provides adequate protein, mineral, and vitamin content so that strength and morale are improved. Under these circumstances, they are better able to cooperate with physiotherapy and to help in their physical rehabilitation.

In the case of patients with tuberculosis or other chronic lung diseases of an inflammatory type, the new antibiotics have not displaced rest and a high caloric, high protein adequate diet. Probably the example par excellence of the value of nutrition in the control of chronic disease can be found in the management of fatty liver and nutritional cirrhosis. Of all therapeutic measures which can be applied, the high protein, high carbohydrate diet with protein content between 150 and 250 grams per day is of greatest importance. Under these conditions serum albumin frequently can be raised, edema and ascites decreased, and regenerating liver cells can be allowed to take over the normal hepatic function.

In the spring and the fall seasons, particularly, the nutrition of patients with chronic disease must be carefully guarded. At these seasons, the symptoms of specific vitamin deficiency diseases are most likely to appear, as they do in regions where pellagra, beriberi, and scurvy are endemic. The metabolic changes which account for this phenomenon are unknown.

## Nutrition Research and Chronic Disease

General problems in the incidence and control of obesity should be investigated. A better definition of obesity is needed. It is possible that an apparently obese person may not be overweight, and that a person of normal weight may have an excessive amount of fat. Data should be collected upon the incidence of obesity in various population groups, and the relationship of dietary habits, environment, and psychological problems to obesity should be investigated.

The older data on the incidence of goiter needs revision. The diagnosis of subcritical vitamin deficiencies is extremely difficult, either by clinical appraisal or by laboratory methods. Yet it is most important that the incidence of such deficiencies in the general population be known and the reasons for such deficiencies be discovered. Additional research in the field of laboratory diagnosis is needed, and careful surveys of population groups should be made in different parts of the country. In such surveys, attention should be paid particularly to the quality of the soil which produces the food, the quality of the

food consumed, and the incidence of subclinical deficiency patterns. In addition, the occurrence of chronic disease in habitually deficient families should be examined.

In the field of more basic research, efforts should be continued to develop methods to learn more about the chemistry of cellular growth and development. This is a field in which nutrition becomes intimately related to the problem of the control of malignant tumors. Work must be continued upon the effect of antimetabolites or antivitamins in the control of tumors—particularly the leukemias—and to discover new methods for controlling growth of cells.

The relationship of cholesterol and fat to the genesis of arteriosclerosis requires continued investigation, even though these nutritional factors may be of only secondary importance to the occurrence of degenerative vascular disease. The relationship of the nutrition of the host to the occurrence of infectious disease also requires continued investigation. Much more work is needed on the problem of nutrition and tooth development from the period of intra-uterine life to old age. These are only a few of the many fruitful fields in which nutrition, biochemistry, and clinical medicine meet.

The chronic disease problem and the aging of tissue are closely related. They are so important to this country and to the entire world that every effort should be made to understand them and bring them under control. Nutrition must be as important to the process of aging of tissue as it is to growth and development, yet only a very small beginning has been made in this field. Aging need not be synonymous with degeneration. Satisfactory nutrition throughout life has the best chance of making such a separation a reality.

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# Cultivating Community Relationships in a Mental Health Program

By Herbert L. Rooney, M.S.S.W.*

The trend toward community participation in health programs has pointed up the unique contribution the social worker can make in fostering community interest and action. The social worker, who has a knowledge of community organization, understands the part the people in the community can take in programs aimed at preventing illness. He accepts their interest in mental health, and he accepts, particularly, their ideas in terms of a program.

Although we are primarily concerned here with the social worker's development of community relationships in a mental health program, many of the community organization skills and attitudes may be applied in some measure by any staff member of a health agency working with the community.

All too frequently the staff member, in his zeal to see his program become a reality in the community, loses sight of the important aim of helping the community attack its own health problems.

In psychiatric case work, the social worker helps the individual patient face the realities of his own problem and, together with the individual, plans for an effective remedy within the scope of the patient's capacities. Similarly, the community must be helped to develop an awareness and understanding of a problem, but it must be free to select its own methods of coping with the situation. If a community health program is to be all embracing, self-sustaining, and an integral part of the community's life, it must come from within, in the democratic group process.

On the other hand, if a health program is autocratically imposed on the community by any agency, the program necessarily becomes dependent upon that agency for its execution and continuance. This means stifling community interest and initiative, both of prime importance in the community's attack on its own problems. For, when we speak of the community we are speaking of people, and this implies a day-to-day relationship with the community. Care must be exercised, therefore, lest a plan be chosen for, rather than by, the community.

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*Community Acceptance*

While much thought and planning is devoted to determining better methods of understanding the community, there is need to focus on the type of relationship between social worker and community which will encourage community participation in plans and action. What makes the probation officer take time from his busy day to stop in at the clinic? Is there a "special" response the club woman anticipates when she telephones to discuss her ideas for a community-wide program of health? Why does a Parent-Teacher Association chairman feel free to seek program help? Although the individual in these instances may respect the training and specialization of the social worker, he wants to feel free not only to admit his perplexities but also, which is of the utmost importance, to communicate his suggestions. When this occurs, many would conclude merely that the community accepts the social worker's services. This acceptance, however, is reciprocal, and it is the worker's initial acceptance of the community which results in full use of his skills.

Frequently asked is how can the health department or community clinic manifest its acceptance of the community. In arriving at an answer, again we center on the approach to people by the social worker employed by the health department or clinic. Here is a major area of contact with the community, and here it is that the social worker sets the pattern for future use or misuse of his agency, for community cooperation or apathy, and for community resourcefulness or inertia. A genuine warmth communicated to people, an appreciation of their interests and their questions and ideas on community health are basic attributes to community work. The social worker also needs to be aware that groups may need help with programs they have chosen and do not want any substitutions which he might suggest. He should utilize the community's facilities as they are instead of proclaiming their inadequacies. The social worker's cooperation with, response to, and acceptance of the individual and the group are reflected in the community's acceptance of the health department or clinic identified with him. Assuming the existence of this mutual acceptance, what are some other values to be derived from this relationship?

We now see a growing acceptance by the public of mental health programs. As the individual is reassured by an understanding approach and appreciation of his individuality, so also does the community derive reassurance about mental health programs from the social worker's approach.

*Work With Groups*

In all health programs, it is important to have a thorough knowledge of the existing services and facilities in the community—such as the

services provided by nurses, doctors, teachers, social agencies, courts, hospitals, and PTA's. These groups and individuals represent the front-line troops in the community since they are in intimate contact with the community's problems. Effective utilization of these groups is essential in welding a unified community health program. This can be achieved if the social worker is willing to cooperate with these groups, to recognize the value of their contributions, to help them carry out their own activities more effectively, and to share with them in total planning.

To do this, the social worker ought to be available for consultation about patient referrals, community health problems, community agency follow-up of patients, school problems, PTA and community program planning, and parent discussion groups. This availability for consultation not only offers the means of assisting groups to work more effectively toward achieving the community's total health program, but also enables the social worker to interpret the principles of health.

Unfortunately, the opportunities inherent in a consultation program are often overlooked in the day-to-day contacts with community groups. This oversight was observed in a community in which a neighborhood group of young mothers was interested in organizing a discussion group and sought program suggestions from the representative of a local health agency. The group's initiative and independence were stifled by this inexperienced individual who suggested that such a program would be under his direction and would have to follow his program exactly. These women, feeling that the representative of the health agency was critical rather than helpful, soon abandoned their plans for a discussion group.

The importance of the community's contributions to the promotion and continuance of a health program has been stressed by the staff of the Prince Georges County Mental Health Clinic. In this demonstration clinic, working within the county health department, all staff members, clerical as well as professional, are "community minded" and, therefore, cooperate fully with varied community groups. Here the social worker has a prime responsibility for developing numerous community relationships through discussion of clinic intake policies, through patient referrals, and through follow-up of patients by means of cooperative planning with community social or health agencies. He also replies to requests for information about the clinic's total program, assists in program planning for community clubs, participates in discussion groups, and offers suggestions for meeting neighborhood problems.

Although community agencies can contribute to a mental health program by referring patients for psychiatric help, the mental health clinic social worker, by working closely with the agencies on cooperative

treatment plans, can enhance their role in the community. Extending the utilization of an agency's services is one method of strengthening existing resources in a total community plan, as illustrated in the following case.

*The Case of Mr. S.*

One of the county's vocational counselors had referred Mr. S. to the Mental Health Clinic for out-patient treatment prior to a possible job transfer. The patient, 38 years of age, had shown symptoms of nausea, tension, inability to concentrate, and apathy, over a period of years, on several different jobs. Mr. S. was married, had four children, and at time of referral was employed as a maintenance helper, receiving an inadequate salary to support his family. Although emotionally secure in his present employment and free from symptoms, he wanted a higher salary. However, he feared a recurrence of symptoms if he changed jobs.

The counselor believed Mr. S. was an unusually capable worker and was anxious to place him in a job commensurate with his ability. Evaluation at the clinic revealed the patient to be a highly intelligent, conscientious, deliberate, and systematic person; in psychological tests he scored particularly well on arithmetic, reasoning, and memory questions. Previous history revealed his symptoms always appeared when he was placed in positions carrying responsibility for the work of other people, in situations which were not orderly and routine, and which called for frequent contact with people. The clinic felt that this patient probably would do best in a job in which he would not have to delegate tasks to subordinates and in which systematic attention to detail, organization, and routine were important. Because of his indecision, it was particularly important that Mr. S. be given a good deal of time to decide for himself about job opportunities offered by the vocational counselor.

During several conferences with the vocational counselor, the social worker interpreted the patient's difficulties, his need for a specific type of vocational placement, and particularly emphasized Mr. S.'s need for ample time in making a definite decision about the employment change. As a result, the counselor refrained from offering Mr. S. specific job opportunities and from urging him to make a hasty decision. The counselor's approach became one of suggesting kinds of possible job situations. Upon the patient's request, the vocational counselor contacted a Government employment specialist and interpreted Mr. S.'s needs in much the same manner as the social worker had originally. In subsequent work on vocational plans he avoided exerting pressure on Mr. S. to accept a position requiring a high degree of responsibility.

Note that an important goal of the social worker was extending

assistance to the counselor in helping him achieve the solution to Mr. S's problem. Numerous similar opportunities arise from cooperative planning with teachers, nurses, social workers, physicians, clergymen, and others. Even a telephone inquiry from a community source about how to refer a particular patient offers the social worker the opportunity of suggesting how the clinic's function may be interpreted to the prospective patient; this, in turn, increases the community agency's understanding of mental health. The school is another example of a potential resource for helping the community develop a mental health awareness and program. Conferences with a visiting teacher, principal, or classroom teacher result in working together to better understand the emotional impact of school on children and to increase awareness of the valuable role of the school in the child's emotional as well as intellectual development.

*School Schedules*

In an informal meeting with the faculty of a rural school, the social worker noted that the teachers were thinking of the effect of the curriculum schedule on the children in their school. The problem peculiar to this area concerned the great distances pupils traveled to and from school. Because of early breakfasts, they became inattentive and restless during the 11 a. m. class. The principal discussed the possibility of a brief mid-morning snack to break the long physical and emotional strain of the school day for the children and teachers as well. This type of mental health conference with the school, while apparently centered on curriculum schedules, illustrates the development of improved teacher attitude and their understanding of the effects of school on children. This is but a beginning process out of which may come further opportunities for a more direct focus on mental health needs within schools.

*Club Programs*

The social worker is frequently asked to speak before lay groups in the community or to help in program development in organizations interested in mental health. Members of these groups can be very influential in advancing plans for a mentally healthy community. They are the John Smiths and Mary Browns who are not clinic patients but who are interested in discussion of the fundamentals of mental health. They are the mothers and fathers anxious to exchange comments with the social worker about bringing up their children in the best manner possible. What approach can be used in meeting these requests? What purpose can one talk fulfill? Should the social worker lecture to the group and, as the authority, answer all questions, or join with the group as a discussion leader? Which of these methods is more effective?

Recognizing the difficulty of answering these questions unaided, the social worker at the Prince Georges County Mental Health Clinic decided to seek the answers within the community itself. The following experience may serve as an illustration.

The social worker was asked to talk before a group of parents whose children attended a cooperative nursery school located in a large apartment development. Since the program chairman did not have a specific topic in mind, the worker suggested a meeting with the program committee to discuss more fully a subject which would have particular interest for the audience. The meeting was arranged, and the committee decided a topic covering healthy family relationships in apartment house living would be particularly appropriate. The members responded enthusiastically to the suggestion of a panel which would include a resident physician and a father as well as the social worker.

The response of the committee and, later, the audience participation seemed to justify the approach used in meeting the initial request. However, other questions were also answered in experience with the same group.

*Aids Study Group*

The program committee, pleased with the preliminary meeting with the social worker and the panel presentation, again sought assistance. For some time, mothers of children enrolled in the nursery school had been meeting monthly in a cooperative child-study session. The program had consisted primarily of reports by individual mothers on child-care books, followed by group discussion. The committee observed that the group was losing interest and sought suggestions for stimulating the program. The social worker felt the practice of discussion among the mothers provided an excellent basis for furthering the program through use of a discussion leader. It was suggested that the Mental Health Clinic might cooperate with the group in a series of four discussions on everyday problems of child care, led by a different staff member on each occasion. In return, the group could be of help to the clinic in evaluating this discussion method. It was agreed the discussions would include early growth and development problems, problems of learning, environmental adjustment, and emotional growth. The committee with considerable enthusiasm then set up a schedule of these monthly meetings.

During each of the four discussions, a staff member from the clinic talked for about 10 or 15 minutes. During the remainder of the hour-and-a-half period, the speaker acted as a leader, stimulating the group's participation in open discussion, encouraging the mothers to draw on their own experiences in answering questions, and aiming toward an objective discussion of mental health principles rather

than a subjective account of an individual problem child. The group was particularly responsive during all the meetings.

It appears in this instance that one talk had fulfilled a purpose not only of maintaining group interest but also of adding impetus to a widening interest in mental health. The mothers' group helped in commenting about the efficacy of the method of presentation used by the staff members.

The mothers held a special summer meeting of their own to evaluate the program and sent a report of group expression to the social worker. The gist of this report was: The meetings were of great value in giving the mothers more confidence in themselves because the meetings revealed (1) that "the authorities found many of their methods acceptable;" (2) that other mothers had similar problems; (3) that help can come from another mother with like experience.

Thus, the informal discussion method was found to be effective through cooperation of community and clinic.

The community at large has become aware of this experience with the mothers' study group and has expressed interest in further development of the plan. The welfare chairman of the women's clubs has begun to plan cooperatively with the clinic to initiate discussion groups of young parents among the county women's clubs. This would indicate one of the beginnings of a community mental health program. There is no end to the need for making the principles of mental health known and for utilizing the community to further this effort. The John Smiths and Mary Browns are now converting their interest in mental health into planned action; as citizens, they are recognizing their responsibility to help in the development of methods aimed at improving the health of all; and finally, they are joining with their neighbors and friends to achieve this aim.

# Influence of Irradiation and Penicillin on Experimental Syphilis Transmission

By T. F. Probey*

Laboratory studies in experimental syphilis in rabbits have demonstrated that *Treponema pallidum* becomes avirulent and will not transmit syphilis when present in blood kept under blood bank conditions for 96 hours (*1*), or when in plasma processed to the dried state (*2*). The recent report by Ravitch, Farmer, and Davis (*3*) demonstrates that under these conditions blood from donors with syphilis should be acceptable for use. The hazard of transfusion syphilis may, therefore, be minimized by the routine processing of blood or blood products. However, the danger still exists in emergency transfusions with freshly drawn blood from syphilitic donors. There is danger of transmitting syphilis with fresh blood from donors in any stage of the disease, but the greatest danger is during the preclinical serologically negative stage of the infection. Kast, Peterson, and Kolmer (*4*) recorded one case of transfusion syphilis from a donor in the incubation period, while Eichenlaub, Stolar, and Wode (*5*) reported that of 41 cases, 6 resulted from donors in the incubation period and 9 from serologically negative donors with primary lesions which were undiscovered at the time of transfusion. In this connection it is interesting to note that Raiziss and Severac (*6*) demonstrated the presence of *T. pallidum* in the blood of rabbits within 5 minutes following testicular inoculation.

Prevention of transfusion syphilis when freshly drawn blood is used would require the use of a sterilizing agent, treponemicidal drug, or possibly irradiation. The use of trivalent organic arsenicals as treponemicidal drugs has been suggested (*4–5*) but has met with little acceptance. In 1939 Kast, Peterson, and Kolmer (*4*), using the arsphenamines, and in 1941 Eichenlaub, Stolar, and Wode (*5*), using mapharsen, demonstrated that these drugs were effective in the prevention of experimental transfusion syphilis.

In the present study the efficiency of penicillin and of ultraviolet irradiation was investigated as treponemicidal agents for the prevention of transfusion experimental syphilis in rabbits.

## Experimental

The experimental procedure followed was the same as that used in previous studies in experimental syphilis in rabbits (*7*).

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The *T. pallidum* suspension was prepared from rabbits infected with the Nichol's strain of *T. pallidum* and showed a well-developed syphilitic orchitis, rich in organisms. Saline suspensions of the emulsified testicular tissue were filtered through sterile gauze and added to the blood or plasma under study. The material was then divided into equal parts, one to be used as the *T. pallidum* infectivity control and the remainder to be exposed to the sterilizing agent.

In the study of the efficacy of penicillin as a treponemicidal agent in the prevention of transfusion syphilis, crystalline penicillin G was added to the whole blood *T. pallidum* suspensions which were then kept in a refrigerator, simulating blood bank conditions. *T. pallidum* infectivity control blood suspensions were kept under identical conditions. Comparable groups of rabbits were inoculated with these blood *T. pallidum* suspensions.

To test the efficiency of penicillin as a treponemicidal agent in immediate transfusions, rabbits were inoculated 1 hour after addition of the drug. And, to test the action of penicillin within the maximum infectivity period of *T. pallidum* under blood bank conditions, rabbits were inoculated 1, 2, 3, and 4 days after addition of the penicillin.

In the first series, the penicillin concentration was 50 units per ml. of whole blood *T. pallidum* suspension. Rabbits were inoculated in both testicles with 0.5 ml. of the suspension. The results, shown in table 1, indicate that 50 units of penicillin per ml. did not prevent the transmission of syphilis. The infectivity of *T. pallidum* in the blood containing this concentration of penicillin was equal to that in the control suspension without penicillin.

To eliminate the possibility of asymptomatic syphilitic infection, all rabbits failing to develop evidence of syphilis were killed and tissue transfers from testicles and popliteal glands were made to normal rabbits 151 to 155 days after original inoculation. All transfer rabbits remained negative, free from evidence of syphilis during 127 days of observation.

Objections to this experiment are (1) the procedure did not follow

Table 1. *Efficiency of penicillin, crystalline G, 50 units per ml., for prevention of experimental syphilis by transfusion in rabbits*

| Inoculation [1] | Controls | | | Penicillin, 50 units, per ml. | | |
|---|---|---|---|---|---|---|
| | Number rabbits | Positive | Negative | Number rabbits | Positive | Negative |
| 1 hour | 2 | 2 | 0 | 2 | 2 | 0 |
| 1 day | 2 | 2 | 0 | 2 | 2 | 0 |
| 2 days | 2 | 0 | [2] 2 | 2 | 1 | [2] 1 |
| 3 days | 2 | 0 | [2] 2 | 2 | 0 | [2] 2 |
| 4 days | 2 | 0 | [2] 2 | 2 | 0 | [2] 2 |

[1] Injected Feb. 25 to Mar. 1, 1946; transferred after 151 to 155 days.
[2] Transfers negative during 127 days of observation.

transfusion methods in that the intratesticular route of infection was used; (2) the amount of penicillin was quite small, 50 units per ml.; and (3) the possibility of *in vivo* action of penicillin must have been practically nil because of the small amount, 1.0 ml., of the inoculum. The study was repeated as follows to meet these objections.

In the second experiment penicillin was added to the blood *T. pallidum* suspension at two-dose levels, 60 units per ml. and 6,000 units per ml. The rabbits were transfused by the ear vein with 7 ml. per kilogram of body weight of a blood *T. pallidum* suspension, and both testicles also were inoculated with 0.5 ml. of the same material.

The amount of the transfused blood *T. pallidum* suspensions, 7 ml. per kilogram, corresponds with the average single, 500 ml., human blood transfusion when the weights and blood volumes of rabbits and human beings are taken in consideration. The penicillin concentration at the higher dose level corresponds with the total number of units in a course of treatment for human syphilis, 3 million units. The lower dose level corresponds with that used in the first experiment.

Rabbit transfusion schedules were the same as those employed in the first experiment except that the transfusions were terminated after the third day. The results (table 2) indicate that rabbits transfused with 7 ml. per kilogram of whole blood *T. pallidum* suspension 1 houı after the addition of penicillin were not protected from transmission of experimental syphilis by either concentration of the drug used. When transfused 1 day after addition of penicillin, rabbits receiving blood *T. pallidum* suspensions containing 6,000 units of penicillin per ml. were protected, whereas those rabbits transfused with the suspension containing 60 units per ml. of the drug were not protected from the transmission of syphilis. Rabbits transfused with the infectivity controls for both of these categories developed syphilis.

As a further check on the possibility of asymptomatic syphilis, all rabbits failing to develop syphilis, and which survived 13 months of observation following transfusion, were inoculated in both testicles with virulent *T. pallidum* (the reinoculation test). Two rabbits with a history of syphilis following transfusion also were reinoculated as controls. Of the 19 negative rabbits subjected to the reinoculation test, 15 developed darkfield positive lesions. The two positive rabbits failed to develop evidence of syphilis.

The four rabbits that failed to develop evidence of syphilis following the reinoculation test had been transfused with blood *T. pallidum* suspension containing 60 units per ml. of penicillin. Presence of syphilitic infection in these four rabbits following reinoculation was established by tissue transfer. The source of the syphilis infection could not be identified, whether originating from the original transfusion or from the reinoculation test. However, the possibility that these four rabbits may have been immune by virtue of an asympto-

matic infection (*8*) transmitted by the original transfusion, as indicated by the negative reinoculation test, should be considered.

*T. pallidum* in the infectivity controls, blood *T. pallidum* suspension without penicillin, used in the first experiment becomes avirulent by the third day of storage, and those used in the second experiment, by the second day of storage under blood bank conditions.

Table 2. *Efficiency of penicillin, crystalline G, 60 units and 6,000 units per ml., for prevention of experimental syphilis by transfusion in rabbits*

| Transfusion schedule [1] | Whole blood *Treponema* suspension with penicillin | | | | | | Without penicillin (controls) | | |
|---|---|---|---|---|---|---|---|---|---|
| | 60 units per ml. | | | 6,000 units per ml | | | | | |
| | Number rabbits | Positive | Negative | Number rabbits | Positive | Negative | Number rabbits | Positive | Negative |
| 1 hour | 3 | 3 | 0 | 3 | 3 | 0 | 3 | 3 | 0 |
| 1 day | 3 | 1 | 2 | 3 | 0 | 3 | 3 | 2 | 1 |
| 2 days | 3 | 0 | 3 | 3 | 0 | 3 | 3 | 0 | 3 |
| 3 days | 3 | 0 | 3 | 3 | 0 | 3 | 3 | 0 | 3 |
| Reinoculation test of negative rabbits [2] | 7 | 3 | [3] 4 | 8 | 8 | 0 | 4 | 4 | 0 |

[1] Transfused (inoculated) Jan 21 to 24, 1948.
[2] Reinoculation test Feb 21, 1949
[3] Subtransfer Oct. 20, 1949 (all positive).

In the study of the efficiency of ultraviolet irradiation as a treponemicidal agent for the prevention of the transmission of syphilis, the test materials were subjected to irradiation before transfusion of the rabbits.

Rabbit whole blood and rabbit plasma were inoculated with saline suspensions of *T. pallidum*, and both suspensions were divided into two equal parts, one of each to be irradiated and the other two, not irradiated, to be the infectivity controls. The plasma *T. pallidum* and the whole blood *T. pallidum* suspensions were subjected to ultraviolet irradiation in that order using the Oppenheimer-Levinson apparatus (*9*). The average exposure time to the ultraviolet light was 0.25 seconds for the plasma and 0.52 seconds for the whole blood. Two groups of rabbits were transfused in the ear vein with 7 ml. per kilogram and concurrently both testicles were inoculated with 0.5 ml. of the test material immediately following irradiation. The group receiving the nonirradiated control material was handled last.

The results (table 3) show that none of the seven rabbits transfused with plasma *T. pallidum* suspension exposed to ultraviolet irradiation developed syphilis. The six rabbits transfused with irradiated whole blood *T. pallidum* suspension developed syphilis. All the rabbits transfused with the nonirradiated *T. pallidum* infectivity controls, seven in each group, developed syphilis.

Table 3. *Efficiency of ultraviolet irradiation for the prevention of experimental syphilis by transfusion in rabbits*

| Transfusion material | Irradiated | | | Nonirradiated | | |
|---|---|---|---|---|---|---|
| | Number rabbits | Syphilis | | Number rabbits | Syphilis | |
| | | Positive | Negative | | Positive | Negative |
| Plasma *Treponema* [1] | 7 | 0 | [3] 7 | 7 | 7 | 0 |
| Whole blood *Treponema* [2] | 6 | 6 | 0 | 7 | 7 | 0 |

[1] Ultraviolet exposure time 0.25 second.
[2] Ultraviolet exposure time 0.52 second.
[3] Reinoculation test: 4 positive, 1 negative, 2 dead.

On the basis of the experimental evidence presented in this study, it would appear that the transmission of syphilis in transfusions with freshly drawn blood from donors with preclinical syphilis will not be prevented by treatment with ultraviolet irradiation, or by crystalline penicillin G in large amount, prior to administration to the recipient.

## Conclusions

Transmission of experimental syphilis in rabbits by transfusion was not prevented by previous exposure of whole blood containing virulent *T. pallidum* to ultraviolet irradiation, using the Oppenheimer-Levinson quartz chamber apparatus, or to crystalline penicillin G in large quantity, added 1 hour before transfusion.

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# Incidence of Disease

*No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring*

## UNITED STATES

### Reports from States for Week Ended April 28, 1951

*Influenza*

The following information is prepared in collaboration with the Influenza Information Center, National Institutes of Health. The number of cases reported for the current week was 1,880 compared with 3,499 for the previous week.

Dr. S. F. Kalter, of the collaborating laboratory at Syracuse University, New York, has reported the isolation of influenza virus from 49 throat washings out of 99 tested. Of 47 paired serum specimens tested by hemagglutination inhibition, the majority had significant increases in titer against a strain of influenza virus isolated in that laboratory and against the FM–1 strain. Some showed a significant increase only against the PR–8 strain, and 1 showed a significant increase against influenza B.

Dr. E. H. Lennette, Director of the Regional Laboratory at Berkeley, Calif., reports a significant increase in titer by the complement fixation test against influenza A virus in 20 paired serum specimens tested during the last 2 weeks of April.

*Gastroenteritis*

Dr. H. M. Erickson, Oregon State Health Officer, has reported 22 cases of food poisoning. Five cases were associated with barbecued turkey or pork sandwiches purchased in a restaurant, and 17 with banana or coconut cream pies supplied by the same manufacturer. *Staphylococcus aureus* was isolated from one unopened pie and in partially eaten pies in households where illness occurred. It was reported that lack of refrigeration of the pies during transportation may have been a contributing factor.

Dr. R. M. Albrecht, New York State Department of Health, reports an outbreak of gastroenteritis occurring among three married couples living in Suffolk County. Dr. Rafle, who conducted the investigation, found pastrami sandwiches to be the probable source of infection. The pastrami was kept on a steam table where the temperature was suitable for bacterial growth. *Staphylococcus aureus* and a gram negative organism were isolated from a sample of pastrami.

*Vincent's Angina*

Dr. A. S. McCown, Virginia Department of Health, has reported a high incidence of Vincent's angina in Tazewell County. More than 100 persons of all ages have been seen in a local hospital. The main complaint was an acute sore throat, often accompanied by a slight rise in temperature. A few instances of multiple family cases were observed, but close personal contact with other cases was usually absent. A similar outbreak occurred 1 year ago. All cases showed spirochetes and fusiform bacilli typical of Vincent's angina.

*Rabies*

Dr. W. R. Geidt, Washington State Department of Health, in a follow-up report of an outbreak of rabies in dogs in Spokane, states that the source of infection of the first case was not found. From March 10 to April 21, a total of 14 dogs and 1 cat were proved to have rabies in the city of Spokane, with an additional animal in the county and also 1 in the adjoining county of Whitman, near the Idaho-Washington boundary line. Five persons have been bitten by confirmed rabid animals. A definite pattern of geographic spread has been noted in the city of Spokane.

A total of 118 cases of rabies in animals was reported in Missouri for the week ended April 28, and 63 for the previous week.

***Comparative Data for Cases of Specified Reportable Diseases: United States***

**[Numbers after diseases are International List numbers, 1948 revision]**

| Disease | Total for week ended— | | 5-year median 1946–50 | Seasonal low week | Cumulative total since seasonal low week | | 5-year median 1945–46 through 1949–50 | Cumulative total for calendar year— | | 5-year median 1946–50 |
|---|---|---|---|---|---|---|---|---|---|---|
| | Apr. 28, 1951 | Apr. 29, 1950 | | | 1950–51 | 1949–50 | | 1951 | 1950 | |
| Anthrax (062) | 2 | ------ | ------ | (1) | (1) | (1) | (1) | 26 | 9 | 17 |
| Diphtheria (055) | 70 | 116 | 164 | 27th | 4,377 | 6,730 | 9,681 | 1,470 | 2,459 | 3,323 |
| Encephalitis, acute infectious (082) | 23 | 9 | 9 | (1) | (1) | (1) | (1) | [2] 263 | 224 | 142 |
| Influenza (480–483) | 1,880 | 3,471 | 1,252 | 30th | 123,220 | 140,842 | 140,842 | 108,678 | 130,258 | 124,108 |
| Measles (085) | 26,461 | 13,203 | 28,426 | 35th | 298,151 | 165,494 | 341,543 | 269,450 | 146,364 | 306,597 |
| Meningitis, meningococcal (057.0) | 92 | 83 | 87 | 37th | [3] 2,785 | 2,530 | 2,489 | [3] 1,824 | 1,616 | 1,517 |
| Pneumonia (490–493) | 1,289 | 2,029 | (4) | (1) | (1) | (1) | (1) | [5] 33,296 | 42,883 | (4) |
| Poliomyelitis, acute (080) | 73 | 69 | 56 | 11th | 341 | 378 | 214 | 1,553 | 1,509 | 782 |
| Rocky Mountain spotted fever (104) | 2 | 2 | 2 | (1) | (1) | (1) | (1) | 7 | 18 | 18 |
| Scarlet fever (050) [6] | 2,251 | 1,468 | 1,988 | 32d | 54,236 | 45,727 | 68,258 | 38,575 | 29,288 | 44,960 |
| Smallpox (084) | ------ | ------ | 5 | 35th | 13 | 41 | 64 | 5 | 20 | 43 |
| Tularemia (059) | 13 | 12 | 14 | (1) | (1) | (1) | (1) | 233 | 346 | 346 |
| Typhoid and paratyphoid fever (040, 041) [7] | 33 | 41 | 52 | 11th | 237 | 249 | 272 | 672 | 759 | 760 |
| Whooping cough (056) | 2,319 | 2,984 | 1,913 | 39th | 48,523 | 65,955 | 65,955 | 26,921 | 44,419 | 36,738 |

[1] Not computed.
[2] Deduction: North Carolina, week ended Mar. 17, 1 case.
[3] Addition: North Carolina, week ended Mar. 17, 1 case.
[4] Data not available.
[5] Addition: Florida, week ended Apr. 14, 22 cases.
[6] Including cases reported as streptococcal sore throat.
[7] Including cases reported as salmonellosis.

## Reported Cases of Selected Communicable Diseases: United States, Week Ended April 28, 1951

[Numbers under diseases are International List numbers, 1948 revision]

| Area | Diphtheria (055) | Encephalitis, infectious (082) | Influenza (480–483) | Measles (085) | Meningitis, meningococcal (057.0) | Pneumonia (490–493) | Poliomyelitis (080) |
|---|---|---|---|---|---|---|---|
| **United States** | **70** | **23** | **1,880** | **26,461** | **92** | **1,289** | **73** |
| **New England** | **3** | | **35** | **889** | **4** | **33** | **1** |
| Maine | | | 25 | 29 | | 6 | |
| New Hampshire | | | 9 | 19 | | 2 | |
| Vermont | | | | 172 | | | |
| Massachusetts | 3 | | | 517 | 1 | | |
| Rhode Island | | | | 8 | | 5 | |
| Connecticut | | | 1 | 143 | 3 | 20 | 1 |
| **Middle Atlantic** | **5** | **7** | **40** | **3,495** | **11** | **186** | **5** |
| New York | 2 | 4 | [1] 7 | 1,169 | 7 | 67 | 3 |
| New Jersey | 2 | 3 | 33 | 723 | 1 | 42 | 1 |
| Pennsylvania | 1 | | | 1,603 | 3 | 77 | 1 |
| **East North Central** | **2** | **8** | **27** | **4,053** | **24** | **127** | **4** |
| Ohio | 1 | | | 1,223 | 9 | | |
| Indiana | | | 4 | 194 | 1 | 15 | 2 |
| Illinois | | 3 | 4 | 630 | 5 | 73 | 2 |
| Michigan | 1 | 4 | 19 | 630 | 5 | 39 | |
| Wisconsin | | 1 | | 1,376 | 4 | | |
| **West North Central** | **4** | **2** | **38** | **1,589** | **7** | **43** | **3** |
| Minnesota | 1 | | 1 | 64 | 1 | 4 | |
| Iowa | | | | 294 | 1 | 3 | 1 |
| Missouri | 3 | | 9 | 206 | 3 | 4 | 1 |
| North Dakota | | 1 | 28 | 77 | 1 | 20 | |
| South Dakota | | | | 13 | | | 1 |
| Nebraska | | 1 | | 15 | | | |
| Kansas | | | | 920 | 1 | 12 | |
| **South Atlantic** | **11** | **2** | **617** | **2,237** | **17** | **155** | **9** |
| Delaware | | | | 14 | | | |
| Maryland | | | 9 | 168 | 1 | 44 | |
| District of Columbia | | | | 69 | | 16 | |
| Virginia | 1 | | 449 | 780 | 4 | 67 | |
| West Virginia | 2 | | | 442 | 2 | | 2 |
| North Carolina | 4 | | | 358 | 5 | | |
| South Carolina | 1 | | 67 | 28 | | 13 | 1 |
| Georgia | | | 92 | 264 | 2 | 15 | 2 |
| Florida | 3 | 2 | | 114 | 3 | | 4 |
| **East South Central** | **15** | | **90** | **1,167** | **11** | **87** | **10** |
| Kentucky | 6 | | 12 | 857 | 4 | 14 | 3 |
| Tennessee | 4 | | 67 | 129 | 3 | | 2 |
| Alabama | 4 | | | 143 | 4 | 51 | 2 |
| Mississippi | 1 | | 11 | 38 | | 22 | 3 |
| **West South Central** | **23** | **2** | **593** | **5,843** | **16** | **515** | **14** |
| Arkansas | 3 | | 422 | 490 | 1 | 71 | |
| Louisiana | | | 1 | 211 | | 17 | 4 |
| Oklahoma | 5 | 2 | 170 | 877 | 2 | 56 | 1 |
| Texas | 15 | | | 4,264 | 13 | 371 | 9 |
| **Mountain** | **2** | | **296** | **1,391** | | **65** | **7** |
| Montana | | | 16 | 45 | | | |
| Idaho | | | | 102 | | | 1 |
| Wyoming | | | | 92 | | 1 | 1 |
| Colorado | | | 21 | 323 | | 15 | 1 |
| New Mexico | 1 | | | 170 | | 12 | |
| Arizona | 1 | | 259 | 606 | | 37 | 4 |
| Utah | | | | 48 | | | |
| Nevada | | | | 5 | | | |
| **Pacific** | **5** | **2** | **144** | **5,799** | **2** | **78** | **20** |
| Washington | 3 | | 6 | 1,212 | | 6 | 1 |
| Oregon | | | 43 | 780 | | 22 | 1 |
| California | 2 | 2 | 95 | 3,807 | 2 | 50 | 18 |
| Alaska | | | 21 | | | | |
| Hawaii | | | 8 | 4 | | 1 | |

[1] New York City only.

## Reported Cases of Selected Communicable Diseases: United States, Week Ended April 28, 1951—Continued

[Numbers under diseases are International List numbers, 1948 revision]

| Area | Rocky Mountain spotted fever (104) | Scarlet fever (050) | Small-pox (084) | Tularemia (059) | Typhoid and paratyphoid fever [1] (040, 041) | Whooping cough (056) | Rabies in animals |
|---|---|---|---|---|---|---|---|
| **United States** | 2 | 2,251 | | 13 | 33 | 2,319 | 294 |
| **New England** | | 228 | | | | 89 | |
| Maine | | 31 | | | | 18 | |
| New Hampshire | | [2] 10 | | | | 4 | |
| Vermont | | 4 | | | | 10 | |
| Massachusetts | | 151 | | | | 43 | |
| Rhode Island | | 2 | | | | 10 | |
| Connecticut | | 30 | | | | 4 | |
| **Middle Atlantic** | 1 | 467 | | 1 | 4 | 1,000 | 5 |
| New York | 1 | [2] 258 | | 1 | 2 | 60 | 5 |
| New Jersey | | 70 | | | | 48 | |
| Pennsylvania | | 139 | | | 2 | 892 | |
| **East North Central** | | 702 | | 1 | 6 | 218 | 24 |
| Ohio | | 172 | | | 2 | 65 | 3 |
| Indiana | | 47 | | | | 12 | 16 |
| Illinois | | 79 | | | 4 | 17 | 2 |
| Michigan | | 328 | | | | 70 | 3 |
| Wisconsin | | 76 | | 1 | | 54 | |
| **West North Central** | | 151 | | | 1 | 60 | 132 |
| Minnesota | | 20 | | | | 8 | 5 |
| Iowa | | 13 | | | | 12 | 9 |
| Missouri | | 53 | | | 1 | 7 | 118 |
| North Dakota | | 5 | | | | 4 | |
| South Dakota | | 6 | | | | 2 | |
| Nebraska | | 8 | | | | | |
| Kansas | | 46 | | | | 27 | |
| **South Atlantic** | 1 | 175 | | 3 | 5 | 177 | 29 |
| Delaware | | 1 | | | | 2 | |
| Maryland | 1 | 36 | | | 1 | 6 | |
| District of Columbia | | 18 | | | 1 | 5 | |
| Virginia | | 19 | | 1 | 1 | 72 | 8 |
| West Virginia | | 39 | | | | | 1 |
| North Carolina | | 44 | | | 2 | 47 | |
| South Carolina | | 1 | | | | 7 | 16 |
| Georgia | | 10 | | 2 | | 21 | 4 |
| Florida | | [2] 7 | | | | 17 | |
| **East South Central** | | 59 | | 1 | 2 | 114 | 38 |
| Kentucky | | 28 | | | | 28 | 16 |
| Tennessee | | 25 | | | 1 | 24 | 15 |
| Alabama | | 4 | | | 1 | 47 | 2 |
| Mississippi | | 2 | | 1 | | 15 | 5 |
| **West South Central** | | 92 | | 3 | 6 | 477 | 64 |
| Arkansas | | 3 | | 1 | 1 | 45 | 2 |
| Louisiana | | 2 | | | | 3 | [3] 28 |
| Oklahoma | | 38 | | 2 | | 31 | 7 |
| Texas | | 49 | | | 5 | 398 | 27 |
| **Mountain** | | 88 | | 4 | 6 | 108 | 1 |
| Montana | | 4 | | 1 | 1 | 5 | |
| Idaho | | 16 | | 1 | 3 | 2 | |
| Wyoming | | 1 | | | | 12 | |
| Colorado | | 16 | | | | 21 | |
| New Mexico | | 2 | | | 1 | 9 | |
| Arizona | | 10 | | | 1 | 57 | 1 |
| Utah | | [2] 39 | | 2 | | 2 | |
| Nevada | | | | | | | |
| **Pacific** | | 289 | | | 3 | 76 | 1 |
| Washington | | 64 | | | | 18 | 1 |
| Oregon | | 34 | | | | 13 | |
| California | | [2] 191 | | | 3 | 45 | |
| Alaska | | 1 | | | | | |
| Hawaii | | 2 | | | 1 | 1 | |

[1] Including cases reported as salmonellosis. [2] Including cases reported as streptococcal sore throat.
[3] Report for March.

*Psittacosis:* California, 1 case.

# FOREIGN REPORTS

## REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

The following reports include only items of unusual incidence or special interest and the occurrence of these diseases, except yellow fever, in localities which had not recently reported cases. All reports of yellow fever are published currently. A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

### Cholera

*Burma.* The incidence of cholera in Bassein increased more than fourfold during the week ended April 21, 1951, from 12 cases the previous week to 53. Conversely, a decrease was noted in Moulmein and Rangoon for the week ended April 21, from 28 cases to 8 and 6 to 2, respectively.

*Pakistan.* During the week ended April 21, 1951, five cases of cholera were reported in Chittagong. Three cases were reported in Dacca for the week ended April 7, 1951.

### Smallpox

*Burma.* During the week ended April 21, 1951, smallpox was reported in ports as follows: Akyab one case, Moulmein two fatal cases, Rangoon four cases.

*India (French).* For the week ended April 14, 1951, 14 cases of smallpox were reported in Karikal (11 cases) and Pondicherry (3).

*Indonesia.* During the week ended April 7, 1951, 92 cases of smallpox were reported in Samarinda, Borneo, and 10 cases were reported in Bandjarmasin. The incidence of smallpox in ports of Java for the week ended April 14 was as follows: Bandoeng two cases, Surabaya six, Tjilatjap one.

### Typhus Fever

*Turkey.* During the week ended April 21, five cases of typhus fever were reported in Istanbul as compared with one case for the previous week.

### Yellow Fever

*Ecuador.* The first case of jungle.yellow fever in Santo Domingo de los Colorados occurred on January 27, 1951, and up to March 21, 53 cases (19 deaths) had been reported. Two of the deaths were histologically confirmed. During the period March 16–29, 5,849 persons within the affected area were vaccinated.

*Gold Coast.* A suspected case of yellow fever reported in Accra on April 4, 1951, was not confirmed. On April 6, one case was reported

and confirmed histologically in Nsawam. One suspected case was reported 30 miles southwest of Wa. The patient, an African male, was admitted to the hospital on April 15, and died the same day. Two suspected cases were reported in Adeiso on April 16, 1951.

*Panama.* One confirmed case of jungle yellow fever was reported in the Province of Bocas del Toro for the week ended April 14, 1951. The exact location was not reported. However, the case occurred near the Costa Rican border and the patient was a Costa Rican.

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The printing of this publication has been approved by the Director of the Bureau of the Budget (August 10, 1949).

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It contains (1) current information regarding the incidence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

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# Public Health Reports

VOLUME 66 | MAY 25, 1951 | NUMBER 21

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Reported Communicable Diseases, 1950

FEDERAL SECURITY AGENCY

PUBLIC HEALTH SERVICE

FEDERAL SECURITY AGENCY

*Oscar R. Ewing, Administrator*

PUBLIC HEALTH SERVICE

*Leonard A. Scheele, Surgeon General*

Division of Public Health Methods

*G. St. J. Perrott, Chief of Division*

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# Public Health Reports

*Vol. 66* • MAY 25, 1951 • *No. 21*

## Evaluation of Detergents

### IV. A Correlation of Washing Performance With Dissolving and Wetting Ability

By C. C. RUCHHOFT and FRANCIS I. NORRIS*

During the past 4 years a study of detergents for use in washing utensils and dishes in dairies and restaurants was undertaken by the Environmental Health Center at the request of a number of State and municipal health departments. Methods of evaluating detergents were investigated, and, in the course of the study, an experimental dishwashing machine and a procedure for a washing performance test were developed (*1*). The reproducibility of the test was not entirely satisfactory at first, and continuing study disclosed some of the factors causing variations in the performance test. The testing procedure for any detergent in this machine was then improved (*2*) so that the relative cleansing ability of dishwashing detergents under standardized conditions could be easily determined. With this testing procedure, dishwashing detergents may be classified as excellent, good, fair, and poor. The performance test may be used by any health laboratory in making recommendations on detergents to restaurant and dairy operators.

However, there are a number of criteria of detergent solutions, such as alkalinity, pH, surface tension, emulsification, and so forth, which are simpler to evaluate and are important factors in detergency. Unfortunately, as is well known, no single or simple characteristic will always indicate the effectiveness of a detergent in dishwashing performance. It was the purpose of this study to determine and compare the various criteria or factors of detergency with the results obtained in the previously described washing performance test. It was hoped that some correlation might be found between the results of the washing performance test and the values of the detergency factors or some combination of them.

*Public Health Service, Environmental Health Center, Cincinnati, Ohio. Presented at the 116th National Meeting of the American Chemical Society, Atlantic City, N. J., September 1949.

NOTE: References 1, 2, and 4 are considered the first three papers in this series.

In this study a detergent is broadly defined as any compound that is used or recommended for cleaning purposes or is used or proposed as an ingredient in cleansers. No attempt was made to obtain samples of all detergents or components of detergents on the market. The number of such materials may easily run into the hundreds. A representative number of samples representing each type of detergent was collected at random as manufacturers' samples or bought in the retail market. The samples used were classified simply as soaps or soap mixtures, alkaline detergents and buffers, surface active agents, and combinations of these upon a basis to be described.

## Washing Performance Test

The laboratory washing performance test was applied to each detergent under study. In this test, glass microscope slides were dipped in a standard soil solution and drained so that uniform amounts of soil were deposited. The slides were then baked for 1 hour at 95° C. Six slides were washed at a time in a 0.3 percent solution of the detergent in Cincinnati tap water[1] at 60° C. for 3 minutes and rinsed for 2 minutes in boiling tap water. Light transmission through clean, soiled, and washed slides was measured in a photometer and the percent of soil removal was calculated following the methods described (*2*). Each detergent was tested on four different days to distribute possible variations in the water, and the mean values were taken as indicative of the relative washing efficiency of the detergent.

Arbitrary washing performance test ratings for excellent, good, fair, and poor dishwashing performance were set up. The percentage of soil removal washing performance ranges adopted for these were: excellent, 93.5 percent and above; good, 81–93 percent; fair, 50–80 percent, and poor, less than 50 percent soil removal. Using this arbitrary scale, it was found that 27 of the 98 detergents were rated as excellent, 22 were good, 14 were fair, and 35 were poor.

## Other Determinations

In addition to washing performance the following determinations were made:

1. Phenolphthalein and total alkalinity, expressed as percent $Na_2O$ in the undissolved sample.

Alkalinity was measured by titrating 50 ml. of 0.3 percent solution of the detergent in distilled water using 0.1000 N HCl with phenolphthalein and a mixed indicator[2] with an endpoint approximately that of methyl orange. The number of ml. HCl x 2.067 equals percentage of $Na_2O$ in the original sample.

[1] Hardness about 100 ppm.

[2] 0 02 grams methyl red ground in mortar with 7.4 ml. N/20 NaOH, 0 109 Brom cresol green ground with 29 ml. N/20 NaOH. (Make up to 100 ml. with distilled water.)

2. Surface tension of a 0.3 percent solution in distilled water at room temperature.

3. Interfacial tension between a 0.3 percent water solution and mineral and cottonseed oils.

Surface and interfacial tension were measured with a DuNouy precision ring tensiometer.

4. Emulsifying ability of a 0.3 percent solution for mineral and and cottonseed oils.

Emulsifying ability was measured with the following qualitative test: 20 ml. of 0.3 percent detergent solution and 10 ml. of oil were carefully poured in a 1-inch test tube. After 10 quick inversions the size of globules and rate of breakdown were observed. Ratings were as follows:

Excellent—small globules, no breakdown in 30 minutes.
Good—medium globules, emulsion standing from 15–20 minutes.
Fair—large globules, emulsion standing from 3–5 minutes.
Poor—large globules breaking down in less than 2 minutes.

5. pH of a 0.3 solution.

pH was determined with a Leeds and Northup electrometric pH meter using a glass electrode. A correction for sodium ions was made.

6. Sequestering ability.

Sequestering ability was determined by titrating 100 ml. of 0.3 percent detergent solution at 60° C. with a solution of $CaCl_2$ containing the equivalent of 10 mg. $CaCO_3$ per ml. until the first permanent turbidity was observed. Results were expressed as ppm $CaCO_3$ absorbed by the solution (*4*).

Spreading coefficient for the solution over the mineral oil and inactive alkalinity (total alkalinity less twice the phenolphthalein alkalinity) were calculated. The alkalinity, pH, surface tension, interfacial tension, emulsifying ability, and sequestering ability of the solution will be referred to hereafter as factors of detergency.

## Analysis of the Data

Analysis of the data indicated no direct correlation of any single factor of detergency with the dishwashing performance test efficiency. When the average value of any factor such as surface tension for all detergents in each of the four washing performance classifications is plotted against washing performance test results, a parabolic curve results. This indicates that a poor detergent may have a single detergency characteristic identical with an excellent detergent. For example, the means of the surface tension for each washing performance group were 33.2, 44.3, 55.6, and 49.0 for the detergents falling in the excellent, good, fair, and poor classifications, respectively. At first glance, this factor appears to be a fair choice for separating the performance groups. While it is one of the best of the factors studied, the standard deviation of the surface tension from the mean value for the performance classification group was found to be $\pm 4.9$, $\pm 10.5$,

±16.5, and ±18.1, respectively, for the four washing performance test classifications. The maximum to minimum surface tension ranges found for the classifications were 46.7–27.3, 60.9–30.0, 71.9–31.7, and 72.0–28.3, respectively. Thus, no division between good and poor detergents can be made on the basis of this factor alone.

When eight characteristics including pH; phenolphthalein, inactive and total alkalinity; surface tension; and interfacial tension, spreading coefficient, and emulsification with mineral oil were taken as criteria, some breakdown into performance groups could be made.

Several methods for classification were tried, but maximum to minimum range values for each performance group were found best for correlation study. Detergents with all detergency factors falling into the maximum to minimum range for these factors in the 93.5–100 percent removal group were evaluated as excellent. In a similar way the entire group of detergency factors was used to evaluate the detergents in the other performance classifications shown by the performance test. Even with this method of evaluation using all factors, only 67 or 68.4 percent of the samples could be classified into the same performance rating indicated by the washing performance test. One of the detergents showing a 2.5 percent soil removal by the performance test would be classified as an excellent detergent when judged by the group of detergency factors. Obviously, detergent efficiency evaluation on the basis of the entire group of factors could not be considered as feasible for all detergents. It was, therefore, decided to determine whether more successful evaluation might be made on some classes of detergents.

## Classification of Detergents

The entire group of detergents was separated into the four classes, that is, combined detergents, alkaline detergents, surface active agents, and soaps. This classification was made using the surface tension, phenolphthalein and total alkalinity, and appearance as criteria. Soaps were classified also on the basis of a distinctive "silky" turbidity which they impart to water of about 100 ppm hardness after standing about 15–30 minutes at room temperature. The outline of the classification is as follows:

| Class | Surface tension limits for class | Alkalinity limits for class in terms of $Na_2O$ | |
|---|---|---|---|
| | | Phenolphthalein | Total |
| | *dynes/cm* | *percent* | *percent* |
| Combined detergents | Less than 60.0 | | Over 7.0. |
| Alkaline detergents and buffers | Over 60 0 | | |
| Surface active agents | Less than 40.0 | Less than 1.0 | |
| Soaps | Less than 40.0 | | Over 3.0. |

While the above classification is simple it was sufficient for the purposes of this study.

The number of samples found in each class and the number and percent found in each performance group are shown in table 1. These data show that of the detergents studied, combined detergents are usually good or excellent; soaps are usually excellent, and alkaline detergents and buffers and surface active agents are generally poor.

A careful study of the characteristics of each class indicated that a rough approximation could be made for grouping the detergents in each class by the maximum to minimum values for selected detergency factors. These maximum to minimum ranges for the selected detergency factors are given in table 2. These data indicate that individual factors cover a wide range in each group for each class of detergents. However, if a combination of factors is used, each factor contributes its influence.

Table 1. *Performance test efficiency ratings for four classes of detergents, by percentage of washing efficiency soil removal range*

| Class | Excellent, 93.5–100 | | Good, 81–93 | | Fair, 50–80 | | Poor, less than 50 | | Total | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Number | Percent | Number | Percent | Number | Percent | Number | Percent | Number | Percent |
| Combined | 17 | 42.5 | 16 | 40.0 | 3 | 7.5 | 4 | 10.0 | 40 | 40.8 |
| Alkaline and buffer | 0 | 0.0 | 2 | 8.4 | 8 | 33.3 | 14 | 58.3 | 24 | 24.5 |
| Surface active agents | 0 | 0.0 | 4 | 20.0 | 1 | 5.0 | 15 | 75.0 | 20 | 20.4 |
| Soaps | 10 | 71.4 | 0 | 0.0 | 3 | 21.4 | 1 | 7.2 | 14 | 14.3 |
| Totals | 27 | ------ | 22 | ------ | 15 | ------ | 34 | ------ | 98 | 100.0 |
| Percent of grand total | ------ | 27.6 | ------ | 22.4 | ------ | 15.3 | ------ | 34.7 | 98 | 100.0 |

*Combined Detergents.* With combined detergents the maximum to minimum values for pH, total alkalinity, surface tension, interfacial tension, and emulsifications are deemed significant.

*Soaps.* With soaps, very low alkalinity indicates poor detergency, but increasing amounts of phenolphthalein and total alkalinity indicate decreasing efficiency.

*Alkaline Detergents.* An increase in inactive alkalinity and minor increases in surface tension tend to decrease the efficiency of alkaline detergents and buffers. Very high or low pH values also decrease the efficiencies of alkaline detergents.

*Surfactants.* Contrary to the results in other classes of detergents, an increased interfacial tension and excellent emulsification indicate a good surface active agent.

Limiting values for the selected factors were established for each class of detergent. These are shown in table 3. By classification according to limits suggested for these factors in table 3, it was found possible to reach the same performance evaluation as the washing performance test in 90 or 91.8 percent of the 98 samples. This is shown in tables 4, 5, 6, and 7.

Table 2. *Maximum and minimum values for factors of detergency correlated with washing performance ratings on four classes of detergents*

| Class and washing performance rating group | pH | | Alkalinity percent $Na_2O$ | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | Phenolphthalein | | Inactive | | Total | |
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| *Combined detergents* | | | | | | | | |
| Excellent | 12.2 | 9.4 | 21.8 | 2.5 | 15.4 | 0.0 | 37.9 | 7.4 |
| Good | 13.0 | 9.2 | 26.0 | 1.1 | 15.2 | 0.0 | 49.6 | 17.4 |
| Fair | 11.3 | 10.1 | 20.6 | 13.6 | 7.3 | 0.0 | 40.5 | 34.5 |
| Poor | 11.8 | 9.3 | 13.4 | 7.0 | 14.6 | 0.0 | 30.2 | 22.5 |
| *Alkaline detergents and buffers* | | | | | | | | |
| Excellent [1] | | | | | | | | |
| Good | 11.8 | 10.3 | 12.7 | 10.4 | 0.8 | 0.6 | 26.0 | 21.6 |
| Fair | 13.0 | 7.3 | 72.2 | 0.0 | 7.4 | 0.0 | 73.8 | 3.7 |
| Poor | 13.0 | 4.4 | 73.0 | 0.0 | 27.3 | 0.0 | 73.9 | 0.0 |
| *Surface active agents* | | | | | | | | |
| Excellent [1] | | | | | | | | |
| Good | 6.9 | 6.3 | 0.0 | 0.0 | 2.3 | 0.4 | 2.3 | 0.4 |
| Fair | 6.3 | 6.3 | 0.0 | 0.0 | 0.2 | 0.2 | 0.2 | 0.2 |
| Poor | 9.1 | 5.2 | 0.6 | 0.0 | 14.0 | 0.1 | 14.0 | 0.1 |
| *Soaps* | | | | | | | | |
| Excellent | 10.6 | 9.5 | 10.3 | 3.6 | 3.4 | 0.0 | 20.0 | 9.3 |
| Good [1] | | | | | | | | |
| Fair | 10.9 | 10.3 | 15.1 | 14.4 | 5.9 | 0.0 | 34.8 | 27.5 |
| Poor | 10.1 | 10.1 | 1.0 | 1.0 | 1.1 | 1.1 | 3.1 | 3.1 |

| Class and washing performance rating group | Surface tension dynes/cm. | | Mineral oil | | | | | | Sequestration | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Interfacial tension dynes/cm. | | Emulsification | | Spreading coefficient | | | |
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| *Combined detergents* | | | | | | | | | | |
| Excellent | 46.2 | 29.2 | 12.9 | 1.8 | E | F | −0.4 | −26.2 | 420 | 0 |
| Good | 56.0 | 34.2 | 28.1 | 5.2 | G | P | −8.9 | −51.3 | 410 | 40 |
| Fair | 58.5 | 45.2 | 24.1 | 14.0 | F | P | −26.4 | −49.8 | 90 | 40 |
| Poor | 40.3 | 30.7 | 21.1 | 1.0 | E | P | −0.2 | −19.7 | >1000 | 0 |
| *Alkaline detergents and buffers* | | | | | | | | | | |
| Excellent [1] | | | | | | | | | | |
| Good | 68.9 | 66.3 | 33.3 | 23.2 | P | P | −56.7 | −69.4 | 400 | 70 |
| Fair | 71.9 | 68.0 | 35.8 | 21.3 | P | P | −54.6 | −75.5 | >1000 | 10 |
| Poor | 72.0 | 64.0 | 36.5 | 18.0 | P | P | −49.4 | −74.7 | >1000 | 20 |
| *Surface active agents* | | | | | | | | | | |
| Excellent [1] | | | | | | | | | | |
| Good | 33.4 | 30.0 | 9.4 | 5.5 | E | E | −2.7 | −9.8 | >1000 | 140 |
| Fair | 31.7 | 31.7 | 3.2 | 3.2 | E | E | −2.1 | −2.7 | 220 | 220 |
| Poor | 39.1 | 28.3 | 14.7 | 1.0 | E | P | +1.4 | −13.9 | >1000 | 0 |
| *Soaps* | | | | | | | | | | |
| Excellent | 30.8 | 27.2 | 5.0 | 1.0 | E | G | +3.7 | −2.4 | 10 | 0 |
| Good [1] | | | | | | | | | | |
| Fair | 33.1 | 31.7 | 5.9 | 4.7 | E | G | −4.0 | −6.2 | 0 | 0 |
| Poor | 30.6 | 30.6 | 8.6 | 8.6 | F | F | −6.4 | −6.4 | 10 | 10 |

E=Excellent; G=Good; F=Fair; P=Poor.
[1] None found with this rating.

Table 3. *Limiting values of factors of detergency for evaluating performance characteristics*

| Class and washing performance rating group | Limiting values of factors | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | pH | | Alkalinity as percent $Na_2O$ | | | | | | Surface tension dynes/cm. | | Mineral oil | | | |
| | | | Phenol-phthalein | | Inactive | | Total | | | | Inter-facial tension dynes/cm. | | Emulsification | |
| | Maximum | Minimum | Maximum | Minimum | Maximum | Minimum | Maximum | Minimum | Maximum | Minimum | Maximum | Minimum | Maximum | Minimum |
| *Combined detergents* | | | | | | | | | | | | | | |
| Excellent | 12.2 | 9.4 | ---- | ---- | ---- | ---- | 40 | 7 | ([1]) | | 13 | 2 | ≥Good or fair if surface tension≤35. | |
| Good | 13 | 9.4 | ---- | ---- | ---- | ---- | 50 | 17 | ([1]) | | 28 | 5 | ≥Good or poor if surface tension≤56 | |
| Fair | 13 | 9.4 | ---- | ---- | ---- | ---- | 50 | 35 | ---- | ---- | 28 | 14 | ---- | ---- |
| Poor | ---- | <9.4 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | >28 | <2 | ---- | ---- |
| *Alkaline detergents and buffers* | | | | | | | | | | | | | | |
| Excellent [2] | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- |
| Good | 12 | 10 | ---- | ---- | 1.0 | ---- | ---- | ---- | 69 | 66 | ---- | ---- | ---- | ---- |
| Fair | 13 | 8 | ---- | ---- | 8.0 | ---- | ---- | ---- | 70.6 | 70 | ---- | ---- | ---- | ---- |
| Poor | ---- | <8 | ---- | ---- | ---- | >8 | ---- | ---- | >70.6 | <66 | ---- | ---- | ---- | ---- |
| *Surface active agents* | | | | | | | | | | | | | | |
| Excellent [3] | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- |
| Good | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 33 | 30 | 10 | 5 | ---- | E |
| Fair | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 33 | 30 | 4 | 3 | ---- | E |
| Poor | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 33 | <30 | >10 | <3 | ---- | < E |
| *Soaps* | | | | | | | | | | | | | | |
| Excellent | ---- | ---- | 10 | 4 | ---- | ---- | 20 | 6 | 31 | 27 | ---- | ---- | ---- | ---- |
| Good | ---- | ---- | 13 | 11 | ---- | ---- | 26 | 21 | ---- | ---- | ---- | ---- | ---- | ---- |
| Fair | ---- | ---- | 16 | 14 | ---- | ---- | 35 | 27 | 33 | 31 | ---- | ---- | ---- | ---- |
| Poor | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- |

[1] See emulsification. [2] None found with this rating.

Table 4. *Correlation of ratings on the basis of detergency factors with rating based on washing performance tests for soaps*

| Soap | Washing performance test efficiency (percent) | Alkalinity as percent $Na_2O$ | | | | Surface tension | | Washing efficiency rating [1] | |
|---|---|---|---|---|---|---|---|---|---|
| | | Phenolphthalein | | Total | | | | | |
| | | Found | Rating group | Found | Rating group | Found | Rating group | By machine | By factor |
| (Castile) | | | | | | | | | |
| 1 | 97.0 | 3.6 | E | 9.3 | E | 27.2 | E | E | E |
| 2 | 97.0 | 9.1 | E | 14.6 | E | 30.0 | E | E | E |
| 3 | 96.0 | 4.1 | E | 11.6 | E | 29.6 | E | E | E |
| 4 | 96.0 | 7.3 | E | 15.7 | E | 30.8 | E | E | E |
| 5 | 96.0 | 6.6 | E | 17.1 | E | 29.2 | E | E | E |
| 6 | 95.5 | 10.3 | E | 20.0 | E | 29.2 | E | E | E |
| 7 | 95.5 | 4.8 | E | 10.2 | E | 28.1 | E | E | E |
| 8 | 94.5 | 6.0 | E | 10.1 | E | 28.4 | E | E | E |
| 9 | 94.5 | 5.2 | E | 10.0 | E | 27.5 | E | E | E |
| 10 | 93.5 | 6.2 | E | 11.8 | E | 29.0 | E | E | E |
| 11 | 80.0 | 15.1 | F | 27.7 | F | 32.1 | F | F | F |
| 12 | 79.0 | 14.7 | F | 27.5 | F | 33.1 | F | F | F |
| 13 | 61.5 | 14.4 | F | 34.8 | F | 31.7 | F | F | F |
| 14 | 0.0 | 1.0 | P | 3.1 | P | 30.6 | E | P | P |

[1] 14, or 100 percent, of ratings in agreement.



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Table 5. *Correlation of ratings on the basis of detergency factors with rating based on washing performance test for surface active agents*

| Surface active detergent | Washing performance test efficiency (percent) | Surface tension dynes/cm. | | Mineral oil | | | | Washing efficiency rating [1] | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Interfacial tension dynes/cm. | | Emulsification | | | |
| | | Found | Rating group | Found | Rating group | Found | Rating group | By machine | By factor |
| 1 | 87.5 | 30.0 | G | 5.5 | G | E | G | G | G |
| 2 | 84.0 | 33.2 | G | 6.9 | G | E | G | G | G |
| 3 | 82.0 | 33 4 | G | 7.2 | G | E | G | G | G |
| 4. Emcol 4150 | 81.5 | 33.2 | G | 9.4 | G | E | G | G | G |
| 5 | 78.0 | 31.7 | G | 3.2 | F | E | G | F | F |
| 6. Emcol 4100 | 13 0 | 28.3 | P | 3.8 | F | F | P | P | P |
| 7. Triton x 200 | 12 0 | 39.0 | P | 14.7 | P | F | P | P | P |
| 8. Emcol 3478-S | 10.5 | 29.1 | P | 2.3 | P | F | P | P | P |
| 9. Triton x 300 | 5 0 | 30.2 | G | 3.8 | F | E | G | P | F |
| 10. Triton A 20 | 2.0 | 34.3 | P | 3.3 | F | E | G | P | P |
| 11. Sharples 218 | 0 | 31.8 | G | 1.8 | P | E | G | P | P |
| 12. Emcol 888 | 0 | 35.5 | P | 1.6 | P | P | P | P | P |
| 13. Biopal G | 0 | 34.3 | P | 1.0 | P | F | P | P | P |
| 14. Onyx Oil and Chem. Co. D921 | 0 | 38.3 | P | 3.5 | F | E | G | P | P |
| 15. Onyx Oil and Chem. Co. D920 | 0 | 39.1 | P | 3.2 | F | G | P | P | P |
| 16 | 0 | 30.1 | G | 1.0 | P | G | P | P | P |
| 17. Triton x 100 | 0 | 32.3 | G | 1.3 | P | E | G | P | P |
| 18. Triton x 155 | 0 | 32.4 | G | 1.0 | P | E | G | P | P |
| 19. Triton x 155 M | 0 | 32.0 | G | 1.6 | P | E | G | P | P |
| 20 | 0 | 34.2 | P | 2.2 | P | F | P | P | P |

[1] 19. or 95 percent. of ratings in agreement.

It must be pointed out that the limiting factors were set by a comparatively few samples and are not definite in some groups. Therefore, these limits were set up merely as a guide and will not show exact performance groupings. The divisions are simple and the counter balancing effect of one factor may change the actual efficiency.

The washing performance test is not sufficiently reproducibile to permit classification of the detergent in any efficiency category with certainty by one test. In a series of four runs for each test, it was found that certain detergents would show large deviations in performance from the mean. It was found that some detergents classified as fair by a long series of tests would occasionally show excellent results. In the same way poor detergents would give good results on some tests. Excellent detergents would sometimes be rated as only good by one washing performance test and good detergents might occasionally run excellent or fair.

The fact that the removal of soil can be evaluated at present for only one type of surface, glass, is an important limitation of the test. The percentage removal of soil from metal or chinaware may differ from that on glass for the various detergents.

With the above limitations in mind, an experiment was conducted using each of the 22 combined detergents which showed less than excellent performance ratings. These 22 detergents were modified by the addition of a nonionic wetting agent, an alkaline agent and/or a

Table 6. *Correlation of ratings on the basis of detergency factors with ratings based on washing performance test for alkaline detergents and buffers*

| Alkaline detergent or buffer | Washing performance test efficiency (percent) | pH | | Inactive alkalinity percent $Na_2O$ | | Surface tension dynes/cm. | | Washing efficiency rating [1] | |
|---|---|---|---|---|---|---|---|---|---|
| | | Found | Rating group | Found | Rating group | Found | Rating group | By machine | By factor |
| 1 | 87.0 | 10.3 | G | 0.6 | G | 68.9 | G | G | G |
| 2 | 82.0 | 11.8 | G | 0.8 | G | 66.3 | G | G | G |
| 3 | 74.5 | 10.9 | G | 0.0 | G | 71.9 | P | F | P |
| 4 | 73.0 | 13.0 | F | 0.0 | G | 70.6 | F | F | F |
| 5 | 71.0 | 10.2 | G | 2.3 | F | 66.2 | G | F | F |
| 6. Sodium tetrapyrophosphate | 65 | 9.8 | F | 1.3 | F | 70.5 | F | F | F |
| 7. Sodium tetraphosphate | 61 | 8.2 | F | 7.4 | F | 70.3 | F | F | F |
| 8. Trisodium phosphate | 59.5 | 12.2 | F | 0 0 | G | 70.5 | F | F | F |
| 9. Sodium hexametaphosphate | 53 | 7.3 | P | 3.7 | F | 71.5 | P | F | P |
| 10. Sodium sesquisilicate | 53 | 12.9 | F | 0.0 | G | 68.0 | G | F | F |
| 11. Sodium meta-silicate | 47 | 12.4 | F | 0.0 | G | 71.2 | P | P | P |
| 12 | 42 | 11.6 | G | 0.0 | G | 64.2 | P | P | P |
| 13. Sodium carbonate | 34.5 | 11.3 | G | 27.0 | P | 70.6 | F | P | P |
| 14. Columbia alkali, modified soda No. 100 | 28.5 | 9.9 | F | 15.8 | P | 70.3 | F | P | P |
| 15. Columbia alkali, modified soda No. 300 | 19.5 | 9.8 | F | 17.4 | P | 71.5 | P | P | P |
| 16 | 19 | 11.0 | G | 7.6 | F | 71.1 | P | P | P |
| 17 | 17 | 13.0 | F | 0.0 | G | 71.4 | P | P | P |
| 18. Columbia alkali, modified soda No. 200 | 11 | 10.3 | G | 8.3 | P | 70.7 | P | P | P |
| 19. Sodium hydroxide | 9 | 13 | F | 0.0 | G | 71.2 | P | P | P |
| 20. Borax | 9 | 9 3 | F | 0.0 | G | 70 8 | P | P | P |
| 21. Sodium bicarbonate | 2 5 | 8.1 | F | 27.3 | P | 71.6 | P | P | P |
| 22. Disodium phosphate | 0 | 8.8 | F | 9.5 | P | 72.0 | P | P | P; |
| 23. Monosodium phosphate | 0 | 4.4 | P | 0.0 | G | 70 3 | F | P | P |
| 24 | 0 | 7.7 | P | 1.4 | F | 62 8 | P | P | P |

[1] 22, or 91.7 percent, of ratings in agreement.

buffer salt to obtain the desired detergency characteristics of excellent detergents. Seven of the alkaline agents classified as fair by performance were modified by adding a nonionic wetting agent to change their characteristics to excellent. Two detergents were formulated by mixtures of materials to obtain excellent detergency characteristics. Washing performance tests were then run on the entire series of detergents. The results are shown in tables 8 and 9.

Of the 15 detergents that were good originally, 13, or 86.7 percent, were improved and showed excellent washing performance tests by slight modification (table 8). The washing performance test efficiency of the two others was improved slightly, from 88 percent to 91.5 percent and from 85 percent to 91 percent. None of the fair or poor detergents were improved to excellent, but all of the fair and one of the poor were brought into the good performance range group with improvements of 11 percent to 37.5 percent in the performance test. Three of the poor detergents were not noticeably improved even with drastic modification. In one case a 50 percent change in composition failed to bring about the desired washing performance test result.

Four of the alkaline or buffer detergents previously rated fair were

Table 7. *Comparison of detergency factors and washing performance test efficiency for combined detergents*

| Combined detergent | Washing performance test efficiency (percent) | pH | | Total alkalinity percent $Na_2O$ | | Surface tension dynes/cm. | Mineral oil | | | | Rating classification [1] | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Interfacial tension dynes/cm. | | Emulsification | | | |
| | | Found | Group | Found | Group | | Found | Group | Found | Group | By performance test | By factors |
| 1 | 99 | 10.0 | E | 10.1 | E | 29.2 | 7.8 | E | E | E | E | E |
| 2 | 96.5 | 11.1 | E | 37.9 | E | 37.4 | 9.6 | E | G | E | E | E |
| 3 | 96.5 | 9.4 | E | 24.4 | E | 33.2 | 4.7 | E | E | E | E | E |
| 4 | 96.5 | 9.8 | E | 27.7 | E | 34.1 | 2.2 | E | E | E | E | E |
| 5 | 96 | 12.2 | E | 26.7 | E | 42.2 | 12.5 | E | G | E | E | E |
| 6 | 96 | 11.5 | E | 37.4 | E | 39.7 | 10.4 | E | F | G | E | G |
| 7 | 96 | 9.8 | E | 7.4 | E | 33.3 | 4.8 | E | E | E | E | E |
| 8 | 96 | 10.1 | E | 19.4 | E | 33.9 | 3.5 | E | E | E | E | E |
| 9 | 96 | 10.9 | E | 19.8 | E | 33.3 | 3.4 | E | E | E | E | E |
| 10 | 96 | 10.3 | E | 28.4 | E | 35.1 | 5.5 | E | E | E | E | E |
| 11 | 96 | 9.8 | E | 33.3 | E | 29.3 | 3.9 | E | F | E | E | E |
| 12 | 95.5 | 10.1 | E | 32.4 | E | 30.7 | 6.1 | E | G | E | E | E |
| 13 | 95 | 11.2 | E | 30.6 | E | 35.9 | 8.7 | E | G | E | E | E |
| 14 | 95 | 12.2 | E | 25.5 | E | 40.9 | 9.8 | E | G | E | E | E |
| 15 | 95 | 12.2 | E | 17.9 | E | 46.2 | 12.9 | E | G | E | E | E |
| 16 | 94 | 10.2 | E | 32.0 | E | 34.5 | 1.8 | E | E | E | E | E |
| 17 | 93.5 | 10.9 | E | 27.5 | E | 39.3 | 10.3 | E | G | E | E | E |
| 18 | 93 | 11.8 | E | 21.5 | E | 46.9 | 14.0 | G | G | G | G | G |
| 19 | 93 | 10.3 | E | 25.6 | E | 38.3 | 10.3 | E | F | G | G | G |
| 20 | 92.5 | 13.0 | G | 49.6 | G | 51.2 | 22.8 | G | P | G | G | G |
| 21 | 92 | 12.2 | E | 23.8 | E | 50.8 | 20.6 | G | F | G | G | G |
| 22 | 92 | 10.7 | E | 35.1 | E | 49.4 | 16.8 | G | F | G | G | G |
| 23 | 91.5 | 9.6 | E | 20.7 | E | 34.2 | 7.5 | E | G | E | G | E |
| 24 | 91 | 12.0 | E | 24.6 | E | 43.0 | 13.4 | G | G | E | G | G |
| 25 | 91 | 12.5 | G | 26.8 | E | 56.0 | 28.1 | G | P | G | G | G |
| 26 | 89.5 | 11.3 | E | 35.1 | E | 51.9 | 20.0 | G | F | G | G | G |
| 27 | 89 | 9.2 | P | 17.4 | E | 36.9 | 5.2 | E | G | E | G | P |
| 28 | 88 | 10.3 | E | 25.2 | E | 35.6 | 12.0 | E | F | G | G | G |
| 29 | 87 | 11.4 | E | 40.2 | G | 37.4 | 6.2 | E | F | G | G | G |
| 30 | 85.5 | 12.4 | G | 26.2 | E | 39.9 | 13.7 | G | G | E | G | G |
| 31 | 85 | 10.7 | E | 32.2 | E | 55.1 | 25.4 | G | P | G | G | G |
| 32 | 84 | 12.1 | E | 32.3 | E | 40.1 | 10.0 | E | G | G | G | G |
| 33 | 82 | 11.7 | E | 42.3 | G | 42.8 | 13.6 | G | G | E | G | G |
| 34 | 78 | 11.3 | E | 40.5 | G | 55.2 | 21.0 | G | F | G | F | G |
| 35 | 69.5 | 10.1 | E | 34.5 | E | 45.2 | 14.0 | G | P | G | F | G |
| 36 | 53 | 10.8 | E | 36.6 | E | 58.5 | 24.1 | G | P | F | F | F |
| 37 | 45.5 | 9.3 | P | 28.6 | E | 30.7 | 21.1 | G | F | E | P | P |
| 38 | 21.0 | 10.4 | E | 22.6 | E | 31.6 | 1.5 | P | E | E | P | P |
| 39 | 3.0 | 11.8 | E | 30.2 | E | 32.0 | 1.0 | P | F | E | P | P |
| 40 | 2.0 | 9.3 | P | 22.5 | E | 40.3 | 12.2 | E | P | P | P | P |

[1] 35, or 87.5 percent, of ratings in agreement.

changed to the excellent rating by the addition of as little as 3 percent nonionic wetting agent, which gave the desired factors for the detergent (table 9). One poor alkaline detergent was modified so that it was rated excellent. One of the poor detergents was made fair by modification, but the other was not improved, even though the desired characteristics were present.

The two formulations made by a combination of alkalies and wetting agents, one with about 17 percent wetting agent and the other with only 3 percent wetting agent, gave washing performance test efficiencies of 97.5 percent and 98 percent, respectively. These were formulated to fall within the excellent limiting factors using alkaline or buffer agents with fair (50 percent–80 percent) ratings and wetting

Table 8. *Results of modification of combined detergents*

| Combined detergent | Washing performance rating | | Washing efficiency percent | | pH | | Total alkalinity percent $Na_2O$ | | Surface tension dynes/cm. | | Mineral oil | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | Interfacial tension dynes/cm. | | Emulsification | |
| | *O | *M | *O | *M | *O | *M | *O | *M | *O | *M | *O | *M | *O | *M |
| 18 | G | E | 93 | 96.0 | 11.8 | 11.1 | 21.5 | 25.8 | 46.9 | 32.8 | 14.0 | 4.0 | G | E |
| 19 | G | E | 93 | 94.5 | 10.3 | 10.5 | 25.6 | 27.5 | 38.3 | 33.0 | 10.3 | 3.7 | F | E |
| 20 | G | E | 92.5 | 97.0 | 13.0 | 12.5 | 49.6 | 32.9 | 51.2 | 32.8 | 22.8 | 4.8 | P | E |
| 21 | G | E | 92 | 96.0 | 12.2 | 12.0 | 23.8 | 22.3 | 50.8 | 33.1 | 20.6 | 5.5 | F | E |
| 22 | G | E | 92 | 96.0 | 10.7 | 10.6 | 35.1 | 38.0 | 49.4 | 32.8 | 16.8 | 4.4 | F | E |
| 24 | G | E | 91 | 97.0 | 12.0 | 11.1 | 24.6 | 28.9 | 43.0 | 35.3 | 13.4 | 6.3 | G | E |
| 25 | G | E | 91 | 96.0 | 12.5 | 12.0 | 26.8 | 23.4 | 56.0 | 33.8 | 28.1 | 6.4 | P | E |
| 26 | G | E | 89.5 | 97.0 | 11.3 | 11.2 | 35.1 | 38.9 | 51.9 | 32.2 | 20.0 | 4.2 | F | E |
| 27 | G | E | 80 | 96.0 | 9.2 | 9.7 | 17.4 | 19.5 | 36.9 | 33.6 | 5.2 | 3.1 | G | E |
| 28 | G | G | 88 | 91.5 | 10.3 | 9.9 | 25.2 | 32.5 | 35.6 | 35.1 | 12.0 | 5.1 | F | E |
| 29 | G | E | 87 | 95.0 | 11.4 | 11.3 | 40.2 | 39.5 | 37.4 | 33.2 | 6.2 | 5.8 | F | E |
| 30 | G | E | 85.5 | 96.0 | 12.4 | 12.2 | 26.2 | 31.4 | 39.9 | 35.3 | 13.7 | 5.5 | G | E |
| 31 | G | G | 85 | 91.0 | 10.7 | 10.5 | 32.2 | 33.9 | 55.1 | 32.2 | 25.4 | 4.7 | P | E |
| 32 | G | E | 84 | 97.0 | 12.1 | 12.0 | 32.3 | 33.0 | 40.1 | 32.5 | 10.0 | 4.5 | G | E |
| 33 | G | E | 82 | 93.5 | 11.7 | 11.4 | 42.3 | 40.1 | 42.8 | 33.2 | 13.6 | 4.7 | G | E |
| 34 | F | G | 78 | 89.0 | 11.3 | 10.1 | 40.5 | 38.7 | 55.2 | 32.7 | 21.0 | 4.0 | F | E |
| 35 | F | G | 69.5 | 81.0 | 10.1 | 9.8 | 34.5 | 29.8 | 45.2 | 33.7 | 14.0 | 4.7 | P | E |
| 36 | F | G | 53 | 83.0 | 10.8 | 10.9 | 36.6 | 40.0 | 58.5 | 32.3 | 24.1 | 4.1 | P | E |
| 37 | P | G | 45.5 | 82.0 | 9.3 | 10.3 | 28.6 | 32.9 | 30.7 | 37.1 | 21.1 | 7.6 | F | E |
| 38 | P | P | 21 | 19.0 | 10.4 | 11.4 | 22.6 | 34.7 | 31.6 | 31.3 | 1.5 | 2.5 | E | G |
| 39 | P | P | 3 | 15.0 | 11.8 | 11.1 | 28.3 | 30.0 | 32.0 | 33.1 | 1.0 | 2.3 | F | G |
| 40 | P | P | 2 | 4.5 | 9.3 | 9.7 | 22.5 | 27.5 | 40.3 | 33.6 | 12.2 | 6.7 | P | E |

*O = Original.
*M = Modified.

agents with poor or fair ratings. The composition of these formulated detergents were as follows:

| *Compound* | *Formula 1* | *Formula 2* |
|---|---|---|
| | *Percent* | *Percent* |
| Trisodium phosphate | 17 | 45 |
| Sodium tetraphosphate | 66 | 44 |
| Wetting agent | 17 | 3 |
| Sodium meta-silicate | — | 8 |

## Discussion

A dish and glass cleanser must have the ability to chemically and/or physically remove soil and prevent it from redepositing. Various authors in the past have attempted to measure cleansing ability of a detergent by single factors. Later work has indicated that soil removal cannot be measured by any single factor. The latter conclusion has been verified in this laboratory.

The factors of detergency may be broken down into three categories:

1. Dissolving power (measured by alkalinity factors).
2. Wetting ability (measured by surface activity factors).
3. Rinsibility.

Although the washing performance test rating of the majority of the samples studied could be correlated with dissolving power and wetting ability, several could not. The majority of the good and many of the fair detergents studied were raised to the excellent performance test

Table 9. *Results of modification of alkaline and formulated detergents*

| Detergent | Washing performance group | | Washing efficiency percent | | pH | | Total alkalinity percent $Na_2O$ | | Surface tension dynes/cm. | | Mineral oil | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | Interfacial tension dynes/cm. | | Emulsification | |
| | *O | *M | *O | *M | *O | *M | *O | *M | *O | *M | *O | *M | *O | *M |
| *Alkaline* | | | | | | | | | | | | | | |
| 6 | F | E | 65.0 | 93.5 | 9.8 | 10.0 | 13.7 | 15.7 | 70.5 | 33.6 | 30.7 | 6.8 | P | E |
| 7 | F | E | 61.0 | 94.0 | 8.2 | 9.4 | 9.9 | 10.9 | 70.3 | 37.2 | 21.3 | 9.0 | P | E |
| 8 | F | E | 59.5 | 94.5 | 12.2 | 12.0 | 18.4 | 22.9 | 70.5 | 32.7 | 37.8 | 5.0 | P | E |
| 10 | F | E | 53.0 | 95.5 | 12.9 | 12.4 | 35.7 | 35.2 | 69.0 | 35.5 | 28.7 | 7.5 | P | E |
| 11 | P | E | 47.0 | 93.5 | 12.4 | 12.0 | 29.3 | 29.0 | 71.2 | 34.3 | 29.1 | 6.5 | P | E |
| 13 | P | F | 34.5 | 65.0 | 11.3 | 11.0 | 55.1 | 55.0 | 70.6 | 33.0 | 30.6 | 5.2 | P | E |
| 20 | P | P | 9.0 | 7.0 | 9.3 | 9.4 | 16.6 | 21.5 | 70.8 | 33.0 | 36.7 | 5.2 | P | E |
| *Formulated* | | | | | | | | | | | | | | |
| 1 | ------ | E | ------ | 97.5 | ------ | 10.0 | ------ | 10.1 | ------ | 29.2 | ------ | 5.8 | ------ | E |
| 2 | ------ | E | ------ | 98.0 | ------ | 11.6 | ------ | 15.1 | ------ | 35.2 | ------ | 7.3 | ------ | E |

*O = Original.
*M = Modified.

range by slight modification of alkalinity and/or surface activity. However, the other fair and poor detergents could not be improved to excellent by modification. This fact suggests that further study of rinsing ability is indicated before accurate estimation of detergent performance may be made on the basis of factors of detergency.

## Summary

A series of about 100 commercial detergents and detergent components representing different types of detergents were included in a study involving the application of the washing performance test and the determination of the various factors of detergency. The factors determined included pH; phenolphthalein, inactive and total alkalinity; surface tension; interfacial tension and emulsification with mineral oil; and sequestering ability. No correlation could be found between the values of any single detergency factor and washing performance. When the samples examined were separated into classes of detergents, that is, soaps, alkaline, surface active, and combined detergents, correlation between a combination of factors and the washing performance test results was demonstrated. Optimum values for each factor were determined by the range set by the maximum-minimum values for the excellent detergents (93.5 percent–100 percent soil removal) for each type. Similarly, the maximum-minimum factor values for the good, fair, and poor detergents for each class were tabulated.

The detergency factors that were significant for evaluating dish-washing detergent performance (in lieu of performance tests) for the various classes of detergents were as follows:

*Soaps.* Phenolphthalein alkalinity, total alkalinity, surface tension.

*Alkaline Detergents.* pH, inactive alkalinity, surface tension.

*Surfactants.* Surface tension, and interfacial tension and emulsification with mineral oil.

*Combined Detergents.* pH, total alkalinity, surface tension, and interfacial tension and emulsification with mineral oil.

In general, however, decreasing pH and emulsifying power, and increasing phenolphthalein, inactive and total alkalinity, surface and interfacial tension indicated decreasing soil removing ability.

Using the limiting values shown in table 3 for the above criteria, it was found possible to correctly correlate with the washing performance test results 100 percent of the soaps, 95 percent of the surface active agents, 91.7 percent of the alkaline detergents, and 87.5 percent of the combined detergents studied. It was also found possible to modify the combined detergents with good washing performance so that the significant chemical and physical characteristics would be within the range of the excellent detergents. This modification improved the washing performance test results of 86.7 percent of them to excellent. However, fair or poor combined detergents were improved only slightly with modification. Fair alkaline detergents could be modified by adding surface active agents so that the characteristics and washing performance test results were excellent. Poor alkaline detergents were improved but slightly by changing their characteristics to match those of excellent detergents.

## Conclusions

From the data presented in this paper, it is concluded that:

1. No single factor of detergency can be used to judge washing performance of the detergent.

2. If the detergent is classified as a soap, surfactant, alkaline, or combined detergent, a comparison of certain pertinent detergency factors will permit prediction of the washing performance of a large percentage of detergents.

3. With present knowledge, a washing performance test is the only reliable method for evaluating the dishwashing performance of detergents.


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# Poultry Diseases as Public Health Problems

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The infectious diseases of animals constitute a considerable hazard to man. In turn, but generally minimized, is the fact that various infections considered native to man are a threat to others of the animal kingdom. Interspecies infection chains or cycles are, as a rule, favored by similarity or closeness of relationship of the hosts. Hence, an infection chain among mammals generally has greater expectancy of prosperity than if it were to involve an avian host or hosts, and vice versa. That this may not inevitably follow is apparent; therefore, the hazards of current poultry diseases to public health are the subject of this discussion.

## Extent of Poultry-Human Disease Problem

A substantial number of infectious and parasitic agents apparently may pass from active or passive residence in poultry to man. In his excellent recent review, Ingalls (*12*) lists 26 such agents including representatives of viral, bacterial, fungal, protozoal, and metazoan nature. Earlier, Brandly (*3*) had discussed the infections common to man and fowl from the standpoint of poultry inspection and public health.

A few of these diseases are mentioned to illustrate the nature of the host-parasite relationship as well as certain epizootiological implications pointing towards means for their ultimate suppression as public health hazards.

Food poisoning or infection in man by the genus *Salmonella* constitutes a vexing problem. Few genera of microbes have such a wide host range. More than 150 antigenic types of *Salmonella* have been recognized. Most of these involve several, if not many, hosts, and the number is being enlarged continually. Therefore, as pointed out by Hinshaw and McNeil (*9*) "There may well be no truly avian nor truly human types; in fact, such a description frequently means only priority in isolation. This is illustrated by *Salmonella typhimurium* which was named for the host from which it was first isolated—the mouse. *S. typhimurium* is now known to be of importance in other hosts, such as birds and humans, while *S. enteritidis* is the more common cause of salmonellosis in mice."

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True staphylococcal and streptococcal food poisoning in man has not been traced directly to avian origin, although the species and types of both these organisms recoverable from fowl have enterotoxic potentialities. Nevertheless, the staphylococci and streptococci are not common causes of disease among birds, and their contamination of poultry eggs or meat foods may be derived from nonavian sources.

Considered a native pathogen of swine, *Erysipelothrix rhusiopathiae* is an occasional and genuine occupational hazard to persons contacting or handling poultry infected with it. Less frequently occurring than swine erysipelas infection but more dangerous to man is the bacterial disease, tularemia, acquired not only by handling infected birds but also by consuming the inadequately cooked flesh.

The recent studies of Felsenfeld and associates (*6*) reemphasize that all three species of *Brucella* may find at least a temporary reservoir in chickens from whence they may be disseminated. Listeriosis is a relatively rare but serious bacterial disease of both fowl and man. The means of natural spread and routes of infection require considerable clarification.

Of the virus infections of man in which birds or poultry may play an active or intermediate role are psittacosis and several of the encephalitides, namely eastern and western equine encephalomyelitis, St. Louis and Japanese B encephalitis, and perhaps unidentified maladies. Psittacosis, native to parrot and related species in the jungle, appears to have expanded its host range spectrum significantly in recent years. Hence, infection among ducks and chickens, as well as columbiform and psittacine birds, would appear to constitute an increasing public health problem.

Further elucidation of the apparently complex infection chains, both direct and alternative, of the encephalitic viruses must precede a better understanding of them and the means of developing more effective combat methods as regards the role of poultry.

Only recently recognized as a public health problem is the virus entity, Newcastle disease. This virus possesses a substantial range of tissue tropisms—pneumal, neural, and endothelial. The latter is manifested in a hemorrhagic conjunctivitis of man which is being reported with increasing frequency. To the earlier records of occupational infection among virus workers in the laboratory and of poultry handlers, Burnet (*4*), Anderson (*1*), Shimkin (*19*), Yatom (*21*), Ingalls and Mahoney (*11*), Freyman and Bang (*7*), may be added the recent case reports of Kujumgiev (*17*), Ingalls (*12*), Boney (*2*), and Gustafson and Moses (*8*).

Current renewed interest in diseases caused by the higher fungi, for example, histoplasmosis, coccidioidal mycosis, and sarcosporidiosis, must embrace further attention to the possible role of poultry and birds from the veterinary public health standpoint.


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Metazoan animal parasites which may infest both man and birds, cyclically or otherwise, include certain mites and lice, schistosomes and echinostomes. Aside from involving the skin or other tissues, these parasites may act as carriers or vectors of virus or other pathogens. Instances include recovery of equine encephalomyelitis and St. Louis encephalitis viruses from chicken mites.

## Adaptation and Spread

The behavior of certain of the aforementioned pathogens, well adjusted to transfer from avian hosts to man, is sufficiently well known so that their suppression and eventual elimination awaits only the activation of the known means of control. This may require the erection of new barriers or precautions, in some instances, and, in others, the repair of old ones. Full scale efforts to discourage marketing of questionable or sick fowl by rigid ante-mortem and post-mortem inspection must precede and accompany well-planned and persistent programs to eradicate the avian reservoirs of infection. On the other hand, there is the perpetual problem of working out unknown epizootiologies and of recognizing new threats, both potential and actual, in the form of bird to man infection chains. In one respect, diseases of fowl and other birds represent a greater hazard to man than those of mammals. The United States population of domesticated fowl or poultry approximates a billion, while that of all our mammals classed as livestock is less than one-half this figure. Numerically then, there is the expectancy of greater opportunity for contact with diseased birds and, with this contact, an increased opportunity for adaptation of the disease agent from Aves to man. Strains of infectious agents, or their elementary components, which have the potential for adaptation to new hosts may, in consequence, more often encounter favorable new soil for their perpetuation.

Recognized as bearing on the transferrability of the infectious agent are such virulence factors as communicability (*20*). Ability to survive during sojourn outside of the animal is a pertinent quality of communicability.

Virulence of certain *Salmonella* has been shown by Maaloe (*18*) to be independent of their ability to penetrate the host's tissues. In contrast, penetrability of *Pasteurella tularensis* (*5*) is an essential attribute of virulence of this agent. Pneumotropism, as it may result in a large release of infective aerosol over a protracted period, would favor a high incidence of exposure and, therewith, selective adaptation. Newcastle disease virus, quite resistant to the poultry house environment, possesses this quality although the virus is eliminated over a brief time, and the carrier rate is low. In contrast, psittacosis is characterized by a more protracted course during which

the infection may be released in substantial quantity. Furthermore, there is a high rate of carrier, latent, and recurrent cases.

Adaptations to new host-parasite relationships are, as a rule, slow. The more recent evidence of infection of man by *Mycobacterium avium* may suggest progress toward adaptation as a result of repeated or prolonged contact.

## Control

Of first importance toward suppressing the incidence of infections which man may acquire from poultry is the prime necessity of eliminating the reservoirs of infection. Improvements in diagnostic or detection methods will be largely nullified without adequate and judicious use of these methods. The need for caution is emphasized by the finding of neutralizing as well as antihemagglutinating factors against Newcastle disease virus which rise in titer following infection of man with mumps virus *(14, 15, 16)*.

The problem which the wide prevalence and extensive host spectrum of the *Salmonella* appears to pose seems less formidable in the light of the experience of Hinshaw and McNeil (*9*) in eradicating paratyphoid infection from turkey ranches. Surveys had shown that snakes might harbor and eliminate the causative *Salmonella* from season to season. Control of snakes removed the reservoir of infection for the turkeys. Likewise, it was found that human carriers may infect poultry and other animals (*10*).

In summation, it may be emphasized that suppression and eventual eradication of transmissible diseases common to birds and man require, at the onset, thorough elucidation of epizootiology together with adequate and often needed improvements in detection and diagnostic methods. These knowledges and skills, supplemented by sound long-range perspectives and practices and abetted by persistent educational programs must inevitably lead to success against this costly and needless loss and waste. Now, and in the future, necessary safeguards must aim to reduce the "occupational hazards" both against established bird to man infection chains, and against the factors of contact and exposure which may favor adaptation of other infectious agents to man from birds, and vice versa. Finally, a sound and inclusive poultry inspection service based on established practices and under competent veterinary supervision must be our primary bulwark toward protecting both the health of the public and the integrity of one of our major sources of food.

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# Reported Incidence of Communicable Diseases in the United States, 1950

This summary presents provisional total cases of communicable diseases reported by the health departments of each State and the outlying territories and possessions to the Public Health Service for the calendar year 1950. The figures represent the cumulation of cases reported each month during the year and are subject to change in the final annual reports released by each State at a later date.

The accompanying table shows the numbers of reported cases of selected communicable diseases by State for 1950. Data for diseases reported with low frequencies or by only a few States are given under the heading, "Additional Diseases."

*Poliomyelitis*

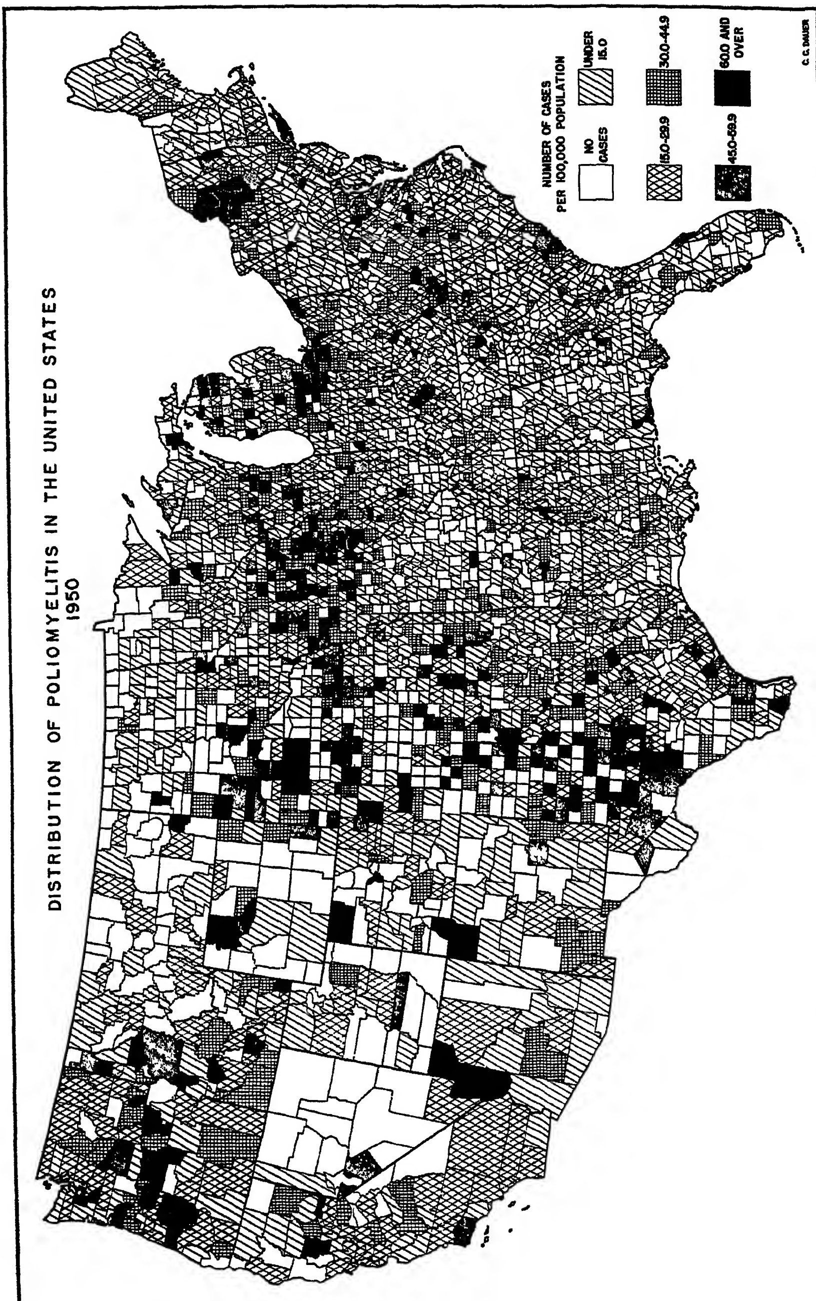
The number of cases of poliomyelitis reported in 1950 was 33,209—21.3 percent lower than the 42,173 cases reported in 1949. The

*Incidence rates for poliomyelitis: United States, each division and State, 1948–50*

(Rates per 100,000 estimated midyear population present in area)*

| Area | 1950 | 1949 | 1948 |
|---|---|---|---|
| United States | 22.0 | 28.4 | 19.1 |
| New England | 13.0 | 37.1 | 4.3 |
| Maine | 10.5 | 49.4 | 4.5 |
| New Hampshire | 6.4 | 43.0 | 4.5 |
| Vermont | 8.4 | 41.7 | 7.3 |
| Massachusetts | 11.0 | 37.8 | 3.8 |
| Rhode Island | 6.9 | 24.4 | 1.0 |
| Connecticut | 24.0 | 32.7 | 6.1 |
| Middle Atlantic | 20.8 | 25.4 | 10.1 |
| New York | 27.5 | 35.5 | 9.7 |
| New Jersey | 17.9 | 31.7 | 17.3 |
| Pennsylvania | 12.7 | 8.1 | 7.3 |
| East North Central | 23.8 | 32.8 | 13.8 |
| Ohio | 22.6 | 22.6 | 14.8 |
| Indiana | 15.5 | 29.5 | 10.4 |
| Illinois | 21.6 | 32.9 | 13.0 |
| Michigan | 31.7 | 46.5 | 12.5 |
| Wisconsin | 27.1 | 35.0 | 20.0 |
| West North Central | 25.3 | 48.9 | 38.3 |
| Minnesota | 19.5 | 64.8 | 50.0 |
| Iowa | 52.6 | 47.9 | 50.7 |
| Missouri | 10.4 | 33.9 | 8.3 |
| North Dakota | 6.8 | 77.4 | 22.6 |
| South Dakota | 27.5 | 66.0 | 158.7 |
| Nebraska | 34.1 | 53.0 | 57.8 |
| Kansas | 26.6 | 39.8 | 18.1 |
| South Atlantic | 21.8 | 9.5 | 22.7 |
| Delaware | 12.6 | 14.4 | 40.4 |
| Maryland | 29.7 | 11.3 | 6.8 |
| District of Columbia | 23.5 | 12.5 | 19.2 |
| South Atlantic—Con. | | | |
| Virginia | 36.4 | 10.2 | 17.6 |
| West Virginia | 18.7 | 18.0 | 9.4 |
| North Carolina | 18.3 | 6.3 | 65.6 |
| South Carolina | 20.1 | 5.5 | 19.3 |
| Georgia | 13.7 | 6.8 | 17.2 |
| Florida | 16.8 | 10.5 | 10.9 |
| East South Central | 16.6 | 16.5 | 8.6 |
| Kentucky | 23.0 | 24.3 | 7.2 |
| Tennessee | 16.9 | 16.6 | 11.7 |
| Alabama | 9.2 | 8.4 | 7.2 |
| Mississippi | 17.8 | 17.2 | 7.9 |
| West South Central | 27.7 | 34.3 | 17.2 |
| Arkansas | 17.4 | 54.2 | 8.0 |
| Louisiana | 15.0 | 8.7 | 6.0 |
| Oklahoma | 23.4 | 61.8 | 16.9 |
| Texas | 36.0 | 30.7 | 23.3 |
| Mountain | 17.0 | 43.3 | 18.9 |
| Montana | 7.8 | 17.4 | 13.3 |
| Idaho | 27.9 | 89.2 | 21.5 |
| Wyoming | 16.0 | 43.5 | 30.5 |
| Colorado | 15.2 | 53.6 | 10.3 |
| New Mexico | 19.5 | 31.0 | 13.7 |
| Arizona | 22.6 | 24.8 | 23.9 |
| Utah | 12.1 | 44.2 | 32.1 |
| Nevada | 13.1 | 17.6 | 15.7 |
| Pacific | 23.4 | 25.8 | 45.3 |
| Washington | 26.6 | 25.0 | 16.6 |
| Oregon | 33.8 | 21.9 | 14.8 |
| California | 21.2 | 26.5 | 56.0 |

*Source of population estimates, Bureau of the Census.


DISTRIBUTION OF POLIOMYELITIS IN THE UNITED STATES
1950
NUMBER OF CASES
PER 100,000 POPULATION
NO CASES
UNDER 15.0
15.0-29.9
30.0-44.9
45.0-59.9
60.0 AND OVER
C.C. DAUER

morbidity rate per 100,000 population in 1950 was 22.0 compared with 28.4 in 1949 and 19.1 in 1948. The States reporting the largest number of cases were New York with 4,079, Texas with 2,778, California with 2,249, and Michigan with 2,031, all of which have large populations. However, the highest morbidity rates were to be found in Iowa with 52.6 cases per 100,000 population; Virginia, 36.4; Texas, 36.0; and Nebraska, 34.5. The States with the lowest rates were New Hampshire, 6.4; North Dakota, 6.8; Rhode Island, 6.9; and Montana, 7.8.

The map shows the distribution of poliomyelitis by counties. Localized areas of varying extent in all parts of the country had relatively high rates of incidence. More of these areas were located in the northern half of the country than in the southern. Individual counties which had excessively high rates were Wythe County, Virginia, where the rate was 810 per 100,000 population; Van Buren County, Iowa, 336; Lewis County, New York, 308; Paulding County, Ohio, 242; and Nelson County, Kentucky, 224.

The peak incidence for the country as a whole was reached later than usual, namely, in the third week of September. In 1949, the peak week was the third week of August. However, as in previous years, the week of highest incidence was reached much earlier in southern States in 1950 than in the northern part of the country.

*Diphtheria*

The incidence of diphtheria reached a new low level during 1950. A total of 5,931 cases was reported, a decrease of more than 25 percent from the number reported for the previous year. The highest incidence on record was 206,939 cases reported by 46 States in 1921. The largest numbers of cases for 1950 were reported in Texas, 900; North Carolina, 503; and Alabama, 319.

*Infectious Encephalitis*

The reported incidence of infectious encephalitis increased for the second consecutive year which may be due to better recognition of the disease. From 575 cases in 1948, the number of reported cases rose to 781 and 1,051, respectively, for 1949 and 1950. The 5-year (1945–49) median was 669. Since 1927, the first year for which data are available, the high years are 1933 with 3,332 cases and 1941 with 3,045 cases, and the low year was 1942 when 564 cases were reported. California reported almost a third, 333 cases, of the total cases reported for the country as a whole. Other States reporting high incidences were New York, 144 cases, and Michigan, 72.

*Influenza and Pneumonia*

There were 284,235 cases of influenza reported for 1950, or more than two and a half times the number, 108,218, reported for the pre-

vious year. The outbreak of influenza, as shown by laboratory examinations, was shown to be due to influenza virus, type A-prime.

The incidence of pneumonia increased slightly for 1950, 85,374 cases from 82,882 for 1949. The 5-year median was also 82,882.

*Measles*

The total of 321,054 cases reported in 1950 indicated that measles was not epidemic in as many parts of the United States as it had been in 1949 when 620,905 cases were reported. The 5-year median was 613,810. The highest incidence on record was in 1941 with 891,051 cases and lowest was 1945 with 144,398. For 1950, the largest numbers were reported in the East North Central States, 98,346 cases, and the Middle Atlantic States, 81,480. The East and West South Central States reported the lowest incidence with 13,040 and 17,893 cases, respectively.

*Meningococcal Meningitis*

The total number of cases of meningococcal meningitis reported for 1950 was 3,700 as compared with 3,469 for 1949. The year of highest incidence for the country as a whole was 1943 when 17,974 were reported.

*Plague*

During 1950, three cases of bubonic plague were reported in the Nation as follows: New Mexico, Lea and Sante Fe Counties, one case each; and Arizona, Fort Defiance, one case.

*Scarlet Fever and Septic Sore Throat*

There were 56,851 cases of scarlet fever reported in 1950, which was the lowest on record. The decline in reported cases of scarlet fever has been partially offset by an increase in the incidence of septic sore throat. During that year, 20,897 cases of septic sore throat were reported compared with 19,867 for 1949, and 15,905 for the 5-year median.

*Smallpox*

There were only 42 cases of smallpox reported in the United States for 1950. Of these, 17 cases were reported in the West North Central States and 10 in the East South Central States. A total of 56 cases was reported in 1949. The peak year for which data are available was 1921, when 45 States reported 102,707 cases.

*Tuberculosis*

Total reported cases of tuberculosis (all forms) was 121,663 as compared with 133,612 for 1949 and a 5-year median of 130,474. These figures were obtained from State semiannual reports in many instances and as such are based on color and sex. A portion of the decline for 1950 appears to be due to changes in the definition of a

reportable case, particularly in relation to cases of borderline significance found in surveys.

*Endemic Typhus Fever*

The peak year for endemic typhus fever was 1944, when 5,353 cases were reported. Since that year, the incidence has been decreasing rapidly to 686 cases reported for 1950. The 5-year median was 1,901 cases. States reporting the largest numbers were Texas, 222; Georgia, 165; and Alabama, 130.

*Venereal Diseases*

Total reported cases of syphilis for the calendar year 1950 was 217,559 as compared with 256,541 reported in 1949. The 5-year median (1945–49) is 349,065.

A decrease in reported cases of gonorrhea and other forms of venereal disease also occurred. For 1950, 286,755 cases of gonorrhea were reported as compared with 318,032 for 1949. A total of 8,212 cases of other venereal diseases were reported, consisting of 5,006 cases of chancroid, 1,779 cases of granuloma inguinale and 1,427 cases of lymphogranuloma.

*Whooping Cough*

The number of cases of whooping cough was 120,157 for 1950, an increase over the 69,377 cases reported for the previous year. However, it was below the 155,991 cases reported in 1947 and the 265,269 reported for the peak year in 1934.

## Additional Diseases

Figures for most of the additional diseases reported by health departments of the States, the territories, and the outlying possessions in 1950, and not shown in the table, are listed below. The numbers in parentheses are category numbers from the manual of the International Statistical Classification of Diseases, Injuries, and Causes of Death, World Health Organization, 1948.

Actinomycosis (132): Colorado 2, Connecticut 1, Georgia 4, Iowa 3, Michigan 2, Minnesota 8, New York 1, Ohio 1, Pennsylvania 1, South Dakota 1, Tennessee 1.

Anthrax (062): Arkansas 1, California 1, Colorado 2, Connecticut 1, Delaware 2, Georgia 1, Maryland 1, Massachusetts 4, New Hampshire 8, New Jersey 7, New York 3, Pennsylvania 21, Texas 1.

Botulism (049.1): California 6, Colorado 3, Minnesota 3, New Mexico 1, Tennessee 1.

Cancer (140–205): Alabama 4,475, Arkansas 522, Colorado 3,290, Florida 4,552, Georgia 292, Idaho 1,098, Kansas 4,622, Louisiana 2,834, Montana 1,104, Nevada 38, New Mexico 834, North Dakota 730, Pennsylvania 8,623, South Carolina 297, Tennessee 3,391, Utah 338, Wyoming 442, Alaska 15, Virgin Islands 7.

## Reported Cases of Selected Communicable Diseases: United States, Each Division and State, 1950

[Numbers under headings are category numbers of the Sixth Revision of the International Lists, 1948]

| Area | Brucellosis (044) | Chickenpox (087) | Diphtheria (055) | Dysentery: Amebic (046) | Dysentery: Bacillary (045) | Encephalitis, infectious (082) | German measles (086) |
|---|---|---|---|---|---|---|---|
| **New England** | **91** | **29,098** | **184** | **22** | **116** | **43** | **6,986** |
| Maine | 12 | 3,424 | 17 | ------- | 2 | 1 | 2,558 |
| New Hampshire | 2 | 1,068 | 8 | ------- | ------- | ------- | 509 |
| Vermont | 8 | 3,124 | 2 | ------- | ------- | 1 | 532 |
| Massachusetts | 22 | 15,032 | 144 | 7 | 104 | 37 | 2,279 |
| Rhode Island | 4 | 1,177 | 8 | ------- | 2 | 1 | 28 |
| Connecticut | 43 | 5,273 | 5 | 15 | 8 | 3 | 1,020 |
| **Middle Atlantic** | **257** | **67,780** | **408** | **1,076** | **503** | **193** | **12,132** |
| New York | 149 | 22,516 | 194 | 1,017 | 475 | 144 | 3,511 |
| New Jersey | 36 | 21,153 | 50 | 49 | 9 | 42 | 6,644 |
| Pennsylvania | 72 | 24,111 | 164 | 10 | 19 | 7 | 1,977 |
| **East North Central** | **804** | **69,033** | **541** | **841** | **373** | **164** | **10,954** |
| Ohio | 41 | 14,231 | 220 | 18 | 20 | 3 | 1,538 |
| Indiana | 42 | 2,412 | 154 | 8 | 8 | 26 | 369 |
| Illinois | 447 | 13,274 | 63 | 617 | 142 | 49 | 1,665 |
| Michigan | 93 | 14,044 | 85 | 197 | 203 | 72 | 6,093 |
| Wisconsin | 181 | 25,072 | 19 | 1 | ------- | 14 | 1,289 |
| **West North Central** | **761** | **15,998** | **285** | **71** | **107** | **77** | **252** |
| Minnesota | 228 | 1,811 | 91 | 47 | 89 | 6 | ------- |
| Iowa | 213 | 1,816 | 24 | 4 | 3 | 7 | 11 |
| Missouri | 80 | 2,160 | 72 | 9 | 8 | 6 | 160 |
| North Dakota | 33 | 646 | 6 | 2 | ------- | 23 | ------- |
| South Dakota | 49 | 527 | 21 | (*) | (*) | 22 | ------- |
| Nebraska | 15 | 2,634 | 21 | 5 | ------- | 1 | ------- |
| Kansas | 143 | 6,404 | 50 | 4 | 7 | 12 | 81 |
| **South Atlantic** | **283** | **13,785** | **1,605** | **321** | **478** | **44** | **371** |
| Delaware | ------- | 212 | 5 | ------- | 2 | 1 | 1 |
| Maryland | 42 | 3,543 | 101 | 9 | 18 | 6 | 176 |
| District of Columbia | 2 | 717 | 3 | 5 | 28 | 1 | ------- |
| Virginia | 67 | 3,037 | 191 | 10 | ------- | 2 | ------- |
| West Virginia | 8 | 1,861 | 191 | 7 | 41 | 5 | 149 |
| North Carolina | 21 | ------- | 503 | 132 | 43 | 1 | ------- |
| South Carolina | 8 | ------- | 213 | 6 | 52 | 7 | ------- |
| Georgia | 99 | 2,470 | 300 | 39 | 246 | 13 | ------- |
| Florida | 36 | 1,945 | 98 | 113 | 48 | 8 | 45 |
| **East South Central** | **172** | **5,316** | **1,048** | **414** | **199** | **57** | **597** |
| Kentucky | 19 | 1,175 | 221 | 149 | 56 | 6 | 180 |
| Tennessee | 48 | 1,832 | 259 | 101 | 75 | 32 | 376 |
| Alabama | 43 | 2,309 | 319 | 45 | (*) | 5 | 41 |
| Mississippi | 62 | ------- | 249 | 119 | 68 | 14 | ------- |
| **West South Central** | **455** | **4,578** | **1,310** | **1,024** | **19,437** | **87** | **213** |
| Arkansas | 35 | 1,707 | 158 | 126 | 217 | 7 | 82 |
| Louisiana | 30 | 364 | 123 | 337 | 2 | 2 | 8 |
| Oklahoma | 102 | 2,507 | 129 | 38 | 22 | 19 | 123 |
| Texas | 288 | ------- | 900 | 523 | 19,196 | 59 | ------- |
| **Mountain** | **137** | **14,372** | **213** | **287** | **1,515** | **42** | **1,765** |
| Montana | 19 | 1,585 | 35 | 8 | 2 | 2 | 194 |
| Idaho | 24 | 1,301 | 25 | 2 | ------- | 7 | 314 |
| Wyoming | 5 | 470 | 5 | 1 | ------- | 1 | 171 |
| Colorado | 55 | 3,205 | 44 | 6 | 25 | 10 | 219 |
| New Mexico | 1 | 807 | 24 | 22 | 63 | 1 | 208 |
| Arizona | 16 | 2,725 | 58 | 221 | 1,424 | 13 | 359 |
| Utah | 14 | 3,995 | 18 | 27 | 1 | 3 | 300 |
| Nevada | 3 | 284 | 4 | ------- | ------- | 5 | ------- |
| **Pacific** | **203** | **35,086** | **337** | **552** | **587** | **344** | **3,176** |
| Washington | 37 | 2,085 | 21 | 27 | 27 | 9 | 362 |
| Oregon | 45 | ------- | 43 | 156 | 8 | 2 | ------- |
| California | 121 | 33,001 | 273 | 369 | 552 | 333 | 2,814 |
| Total 1950 | 3,163 | 255,046 | 5,931 | 4,608 | 23,315 | 1,051 | 36,446 |
| Total 1949 | 4,124 | 373,324 | 8,027 | 5,374 | 28,503 | 781 | 92,267 |
| Median 1945–49 | 4,959 | 317,565 | 12,405 | 4,073 | 24,164 | 669 | 29,222 |
| Alaska | 1 | 686 | 2 | ------- | ------- | 1 | 47 |
| Hawaii | 4 | 1,517 | 10 | 6 | 101 | 1 | 77 |
| Panama Canal Zone | 2 | 329 | 41 | 68 | 61 | ------- | 62 |
| Puerto Rico | ------- | 933 | 408 | ------- | ------- | ------- | ------- |
| Virgin Islands | ------- | 21 | ------- | ------- | ------- | ------- | ------- |

*Reported not notifiable.

## Reported Cases of Selected Communicable Diseases: United States, Each Division and State, 1950—Continued

[Numbers under headings are category numbers of the Sixth Revision of the International Lists, 1948]

| Area | Hepatitis, infections (092, part) | Hookworm disease (129) | Influenza (480–483) | Malaria (110–117) | Measles (085) | Meningitis, meningococcal (057.0) | Mumps (089) |
|---|---|---|---|---|---|---|---|
| **New England** | **27** | **4** | **1,613** | **6** | **19,468** | **140** | **20,829** |
| Maine | 8 | ------- | 1,443 | ------- | 999 | 24 | 3,318 |
| New Hampshire | ------- | ------- | 55 | ------- | 572 | 5 | 775 |
| Vermont | ------- | ------- | 15 | ------- | 607 | 2 | 4,283 |
| Massachusetts | 8 | ------- | (*) | 3 | 12,854 | 61 | 8,431 |
| Rhode Island | ------- | ------- | 24 | ------- | 342 | 11 | 347 |
| Connecticut | 11 | 4 | 76 | 3 | 4,094 | 37 | 3,675 |
| **Middle Atlantic** | **730** | **191** | **646** | **23** | **81,480** | **587** | **48,758** |
| New York | 102 | 190 | [1] 302 | 12 | 32,515 | 248 | 14,135 |
| New Jersey | ------- | ------- | 204 | 10 | 30,813 | 79 | 10,335 |
| Pennsylvania | 628 | 1 | 140 | 1 | 18,152 | 260 | 24,288 |
| **East North Central** | **123** | **13** | **4,336** | **29** | **98,346** | **725** | **41,677** |
| Ohio | ------- | 2 | 210 | 2 | 13,490 | 227 | 9,678 |
| Indiana | 36 | ------- | 400 | 1 | 7,604 | 31 | 1,147 |
| Illinois | 43 | ------- | 423 | 22 | 19,220 | 223 | 6,974 |
| Michigan | 44 | 11 | 142 | ------- | 38,245 | 132 | 9,916 |
| Wisconsin | ------- | ------- | 3,161 | 4 | 19,787 | 112 | 13,962 |
| **West North Central** | **439** | **5** | **3,258** | **5** | **24,384** | **301** | **14,704** |
| Minnesota | 411 | ------- | 169 | 2 | 4,037 | 66 | 17 |
| Iowa | 14 | 1 | ------- | 1 | 10,872 | 44 | 2,231 |
| Missouri | ------- | ------- | 516 | 2 | 2,372 | 99 | 1,371 |
| North Dakota | ------- | ------- | 803 | ------- | 372 | 19 | 16 |
| South Dakota | ------- | 2 | 11 | ------- | 808 | 18 | 240 |
| Nebraska | 1 | ------- | 774 | ------- | 3,924 | 16 | 1,500 |
| Kansas | 13 | 2 | 985 | ------- | 1,999 | 39 | 9,329 |
| **South Atlantic** | **5** | **10,051** | **78,078** | **192** | **24,931** | **562** | **9,467** |
| Delaware | ------- | ------- | 4 | ------- | 628 | 18 | 119 |
| Maryland | 4 | ------- | 628 | 6 | 1,544 | 63 | 2,096 |
| District of Columbia | ------- | ------- | 85 | 2 | 1,783 | 16 | 697 |
| Virginia | ------- | ------- | 53,282 | 16 | 2,947 | 121 | 2,575 |
| West Virginia | 1 | ------- | 14,869 | 1 | 6,171 | 78 | 1,501 |
| North Carolina | ------- | ------- | ------- | 37 | 5,116 | 108 | ------- |
| South Carolina | ------- | ------- | 2,849 | 86 | 2,001 | 46 | ------- |
| Georgia | ------- | ------- | 6,126 | 37 | 2,240 | 64 | 1,027 |
| Florida | ------- | 10,051 | 235 | 7 | 2,501 | 48 | 1,452 |
| **East South Central** | **233** | **3,237** | **16,236** | **175** | **13,040** | **439** | **3,563** |
| Kentucky | 18 | 162 | 2,630 | 6 | 5,315 | 137 | 934 |
| Tennessee | 215 | 14 | 5,321 | 18 | 3,760 | 166 | 1,330 |
| Alabama | ------- | ------- | 7,784 | 87 | 1,654 | 84 | 1,299 |
| Mississippi | ------- | 3,061 | 501 | 64 | 2,311 | 52 | ------- |
| **West South Central** | **1** | **1,162** | **160,670** | **1,755** | **17,893** | **520** | **5,246** |
| Arkansas | ------- | 10 | 17,419 | 52 | 1,885 | 63 | 2,071 |
| Louisiana | ------- | 1,111 | 123 | 5 | 786 | 61 | 242 |
| Oklahoma | 1 | 41 | 11,768 | 93 | 646 | 51 | 2,933 |
| Texas | ------- | ------- | 131,360 | 1,605 | 14,576 | 345 | ------- |
| **Mountain** | **46** | **2** | **17,679** | **23** | **20,529** | **80** | **10,808** |
| Montana | 13 | ------- | 5,184 | ------- | 1,833 | 8 | 615 |
| Idaho | 8 | ------- | 2,518 | 1 | 1,875 | 8 | 630 |
| Wyoming | 6 | ------- | 382 | 3 | 651 | 9 | 411 |
| Colorado | 4 | ------- | 2,546 | 3 | 5,431 | 27 | 2,332 |
| New Mexico | ------- | ------- | 114 | 1 | 972 | 3 | 782 |
| Arizona | ------- | ------- | 6,198 | 13 | 2,566 | 17 | 2,742 |
| Utah | 9 | ------- | 271 | ------- | 6,861 | 7 | 3,094 |
| Nevada | 6 | 2 | 466 | 2 | 340 | 1 | 202 |
| **Pacific** | **274** | **3** | **1,719** | **19** | **20,983** | **346** | **34,779** |
| Washington | 99 | ------- | 635 | 1 | 3,695 | 65 | 1,434 |
| Oregon | 127 | 3 | 595 | 1 | 784 | 39 | ------- |
| California | 48 | ------- | 489 | 17 | 16,504 | 242 | 33,345 |
| Total 1950 | 2,727 | 14,668 | 284,235 | 2,227 | 321,054 | 3,700 | 189,831 |
| Total 1949 | 1,961 | 15,810 | 108,218 | 4,231 | 620,905 | 3,469 | 214,073 |
| Median 1945–49 | 1,458 | 15,810 | 284,138 | 17,317 | 613,810 | 3,469 | 196,317 |
| Alaska | 5 | ------- | 535 | 1 | 346 | 5 | 491 |
| Hawaii | 5 | ------- | 3,483 | 1 | 80 | 7 | 152 |
| Panama Canal Zone | ------- | ------- | 20 | 436 | 1,244 | 5 | 1,322 |
| Puerto Rico | ------- | ------- | 1,025 | 96 | 2,163 | ------- | ------- |
| Virgin Islands | ------- | ------- | ------- | ------- | ------- | 1 | 2 |

*Reported not notifiable.
[1] New York City only.

## Reported Cases of Selected Communicable Diseases: United States, Each Division and State, 1950—Continued

[Numbers under headings are category numbers of the Sixth Revision of the International Lists, 1948]

| Area | Pneumonia (490–493) | Poliomyelitis (080.0–080.3) | Rheumatic fever (400–402) | Rocky Mountain spotted fever (104) | Scarlet fever (050) | Septic sore throat (051) | Smallpox (084) |
|---|---|---|---|---|---|---|---|
| **New England** | **2,742** | **1,211** | **98** | ------- | **6,339** | **475** | ------- |
| Maine | 668 | 96 | 7 | ------- | 383 | 40 | ------- |
| New Hampshire | 1 | 34 | ------- | ------- | 278 | ------- | ------- |
| Vermont | 25 | 32 | ------- | ------- | 143 | 47 | ------- |
| Massachusetts | (*) | 513 | (*) | ------- | 4,423 | 108 | ------- |
| Rhode Island | 193 | 54 | 91 | ------- | 265 | 16 | ------- |
| Connecticut | 1,855 | 482 | (*) | ------- | 847 | 264 | ------- |
| **Middle Atlantic** | **17,622** | **6,280** | **663** | **39** | **9,956** | **90** | ------- |
| New York | 11,379 | 4,079 | (*) | 14 | [1] 4,902 | (1) | ------- |
| New Jersey | 2,908 | 867 | (*) | 10 | 1,410 | 90 | ------- |
| Pennsylvania | 3,335 | 1,334 | 663 | 15 | 3,644 | ------- | ------- |
| **East North Central** | **8,924** | **7,267** | **759** | **29** | **16,970** | **899** | **2** |
| Ohio | 1,937 | 1,794 | 85 | 7 | 6,541 | 31 | 1 |
| Indiana | 562 | 610 | 11 | 8 | 1,536 | 5 | ------- |
| Illinois | 3,856 | 1,890 | 183 | 12 | 2,087 | 90 | ------- |
| Michigan | 1,963 | 2,031 | 473 | 2 | 4,665 | 521 | ------- |
| Wisconsin | 606 | 942 | 7 | ------- | 2,141 | 252 | 1 |
| **West North Central** | **6,177** | **3,581** | **135** | **5** | **3,327** | **241** | **17** |
| Minnesota | 1,882 | 585 | 116 | ------- | 719 | 203 | ------- |
| Iowa | 91 | 1,389 | 2 | ------- | 356 | 3 | 2 |
| Missouri | 862 | 414 | 2 | 2 | 644 | 20 | 2 |
| North Dakota | 2,456 | 43 | 6 | ------- | 128 | 5 | 1 |
| South Dakota | 16 | 183 | (*) | ------- | 118 | 3 | 2 |
| Nebraska | 215 | 457 | 1 | 1 | 555 | ------- | 7 |
| Kansas | 655 | 510 | 8 | 2 | 807 | 7 | 3 |
| **South Atlantic** | **10,719** | **4,631** | **316** | **242** | **5,358** | **3,410** | ------- |
| Delaware | 19 | 40 | 1 | 1 | 132 | ------- | ------- |
| Maryland | 1,587 | 695 | 70 | 57 | 756 | 42 | ------- |
| District of Columbia | 895 | 184 | 4 | 1 | 206 | ------- | ------- |
| Virginia | 3,616 | 1,205 | 110 | 76 | 937 | 2,756 | ------- |
| West Virginia | 660 | 378 | 39 | 12 | 550 | 251 | ------- |
| North Carolina | ------- | 751 | ------- | 71 | 1,855 | 47 | ------- |
| South Carolina | 498 | 431 | 28 | 11 | 185 | 35 | ------- |
| Georgia | 2,820 | 476 | 64 | 13 | 546 | 194 | ------- |
| Florida | 624 | 471 | (*) | ------- | 191 | 85 | ------- |
| **East South Central** | **7,506** | **1,915** | **365** | **49** | **3,600** | **292** | **10** |
| Kentucky | 1,282 | 683 | 32 | 7 | 1,105 | 138 | 7 |
| Tennessee | 2,422 | 556 | 91 | 22 | 1,587 | 154 | 1 |
| Alabama | 2,373 | 283 | 178 | 15 | 611 | (*) | ------- |
| Mississippi | 1,429 | 393 | 64 | 5 | 297 | (*) | 2 |
| **West South Central** | **24,689** | **4,049** | **98** | **29** | **2,316** | **10,686** | **6** |
| Arkansas | 1,978 | 337 | 9 | 16 | 195 | 1,899 | ------- |
| Louisiana | 1,369 | 404 | 37 | 4 | 168 | 13 | ------- |
| Oklahoma | 1,966 | 530 | 52 | 9 | 510 | 386 | 5 |
| Texas | 19,376 | 2,778 | (*) | ------- | 1,443 | 8,388 | 1 |
| **Mountain** | **3,357** | **877** | **434** | **59** | **1,995** | **3,733** | **6** |
| Montana | 40 | 47 | 3 | 15 | 382 | 149 | ------- |
| Idaho | 395 | 166 | 64 | 10 | 239 | 492 | ------- |
| Wyoming | 66 | 47 | 37 | 4 | 56 | 3 | ------- |
| Colorado | 1,147 | 205 | 113 | 17 | 436 | 211 | 2 |
| New Mexico | 567 | 136 | 59 | 2 | 163 | 4 | 1 |
| Arizona | 926 | 171 | 129 | ------- | 433 | 2,411 | 1 |
| Utah | 138 | 84 | 29 | 7 | 266 | 19 | ------- |
| Nevada | 78 | 21 | ------- | 4 | 20 | 444 | 2 |
| **Pacific** | **3,638** | **3,398** | **767** | **15** | **6,990** | **1,071** | **1** |
| Washington | 663 | 632 | 282 | ------- | 1,671 | 88 | ------- |
| Oregon | 908 | 517 | 83 | 12 | 597 | 350 | 1 |
| California | 2,067 | 2,249 | 402 | 3 | 4,722 | 633 | ------- |
| Total 1950 | 85,374 | 33,202 | 3,635 | 467 | 56,851 | 20,897 | 42 |
| Total 1949 | 82,882 | 42,173 | 4,457 | 560 | 74,913 | 19,867 | 56 |
| Median 1945–49 | 82,882 | 25,196 | 4,515 | 560 | 84,379 | 15,905 | 173 |
| Alaska | 64 | 62 | 30 | ------- | 18 | 71 | ------- |
| Hawaii | 23 | 23 | 28 | ------- | 28 | 5 | ------- |
| Panama Canal Zone | 425 | 74 | 5 | ------- | 5 | ------- | 2 |
| Puerto Rico | ------- | 38 | ------- | ------- | ------- | ------- | ------- |
| Virgin Islands | ------- | ------- | ------- | ------- | ------- | ------- | ------- |

* Reported not notifiable.
[1] Cases reported as septic sore throat included with scarlet fever.

## Reported Cases of Selected Communicable Diseases: United States, Each Division and State, 1950—Continued

[Numbers under headings are category numbers of the Sixth Revision of the International Lists, 1948]

| Area | Tetanus (061) | Trachoma (095) | Trichiniasis (128) | Tuberculosis (all forms) (001–019) | Tularemia (059) | Typhoid fever (040) | Paratyphoid fever [1] (041) |
|---|---|---|---|---|---|---|---|
| **New England** | **25** | - | **66** | **5,137** | **2** | **64** | **81** |
| Maine | 5 | - | 13 | 405 | - | 14 | 3 |
| New Hampshire | 1 | - | - | 161 | - | 6 | 1 |
| Vermont | - | - | - | 252 | - | 1 | - |
| Massachusetts | 9 | - | 33 | 2,493 | 2 | 21 | 68 |
| Rhode Island | 5 | - | 4 | 471 | - | 8 | 1 |
| Connecticut | 5 | - | 16 | 1,295 | - | 14 | 8 |
| **Middle Atlantic** | **32** | **1** | **157** | **22,481** | **12** | **310** | **143** |
| New York | 22 | 1 | 127 | 13,372 | 1 | 82 | 89 |
| New Jersey | 6 | - | 13 | 3,058 | 2 | 61 | 13 |
| Pennsylvania | 4 | - | 17 | 6,051 | 9 | 167 | 41 |
| **East North Central** | **57** | **20** | **34** | **24,546** | **115** | **302** | **165** |
| Ohio | 10 | 1 | 19 | 7,300 | 6 | 121 | 8 |
| Indiana | 12 | - | 2 | 2,237 | 26 | 48 | 8 |
| Illinois | 19 | 5 | 2 | 7,588 | 71 | 74 | 3 |
| Michigan | 16 | 1 | 11 | 5,800 | 9 | 43 | 136 |
| Wisconsin | - | 13 | - | 1,621 | 3 | 16 | 10 |
| **West North Central** | **29** | **863** | **7** | **7,949** | **63** | **141** | **28** |
| Minnesota | 8 | 6 | 6 | 2,675 | 1 | 7 | 22 |
| Iowa | 2 | - | - | 852 | - | 9 | - |
| Missouri | 7 | 688 | - | 2,989 | 53 | 87 | 2 |
| North Dakota | 2 | 22 | - | 292 | 2 | 3 | 2 |
| South Dakota | 1 | 124 | - | 286 | - | 2 | - |
| Nebraska | 1 | 22 | 1 | 292 | - | 7 | 1 |
| Kansas | 8 | 1 | - | 563 | 7 | 26 | 1 |
| **South Atlantic** | **101** | **28** | **7** | **20,799** | **184** | **434** | **147** |
| Delaware | - | - | 2 | 315 | - | 11 | 3 |
| Maryland | 12 | 1 | 3 | 2,635 | 15 | 41 | 8 |
| District of Columbia | 2 | - | 2 | 1,672 | - | 7 | 7 |
| Virginia | 11 | - | - | 3,555 | 44 | 68 | 20 |
| West Virginia | 1 | 26 | - | 2,099 | 3 | 69 | 4 |
| North Carolina | - | - | - | 3,658 | 26 | 60 | 8 |
| South Carolina | 2 | - | - | 1,333 | 9 | 71 | 5 |
| Georgia | 35 | - | - | 3,192 | 69 | 77 | 53 |
| Florida | 38 | 1 | (*) | 2,340 | 18 | 30 | 39 |
| **East South Central** | **112** | **30** | **1** | **11,993** | **112** | **353** | **48** |
| Kentucky | 5 | 27 | - | 3,501 | 12 | 118 | 4 |
| Tennessee | 37 | 3 | 1 | 4,005 | 33 | 126 | 27 |
| Alabama | 42 | - | (*) | 3,092 | 19 | 52 | 16 |
| Mississippi | 28 | - | (*) | 1,395 | 48 | 57 | 1 |
| **West South Central** | **59** | **203** | **5** | **10,883** | **347** | **651** | **82** |
| Arkansas | 24 | 77 | - | 2,001 | 193 | 117 | 4 |
| Louisiana | 30 | - | 2 | 2,254 | 27 | 138 | 16 |
| Oklahoma | 5 | 54 | 3 | 2,010 | 63 | 83 | 19 |
| Texas | (*) | 72 | (*) | 4,618 | 64 | 313 | 43 |
| **Mountain** | **7** | **419** | **7** | **6,428** | **95** | **124** | **34** |
| Montana | 1 | 74 | - | 422 | 31 | 10 | 2 |
| Idaho | 3 | - | 6 | 185 | 2 | 13 | 10 |
| Wyoming | - | 7 | - | 89 | 9 | 3 | - |
| Colorado | - | - | 1 | 1,657 | 2 | 23 | 8 |
| New Mexico | 2 | 26 | - | 910 | 7 | 45 | 4 |
| Arizona | 1 | 307 | - | 2,623 | 3 | 27 | 6 |
| Utah | - | - | - | 369 | 39 | 2 | 3 |
| Nevada | - | 5 | - | 173 | 2 | 1 | 1 |
| **Pacific** | **51** | **29** | **35** | **11,447** | **4** | **136** | **439** |
| Washington | - | 2 | 13 | 1,896 | - | 21 | 42 |
| Oregon | 2 | 6 | 2 | 676 | 2 | 12 | 8 |
| California | 49 | 21 | 20 | 8,875 | 2 | 103 | 389 |
| Total 1950 | 473 | 1,593 | 319 | 121,663 | 934 | 2,515 | 1,167 |
| Total 1949 | 522 | 1,405 | 342 | 133,612 | 1,218 | 2,842 | 1,312 |
| Median 1945–49 | 488 | 1,405 | 342 | 130,474 | 1,465 | 2,905 | 1,006 |
| Alaska | - | - | - | 778 | 1 | 19 | - |
| Hawaii | 13 | - | - | 372 | - | - | 1 |
| Panama Canal Zone | 11 | - | - | 354 | - | 19 | - |
| Puerto Rico | 156 | - | - | 5,857 | - | 74 | - |
| Virgin Islands | - | - | 12 | 8 | - | - | - |

*Reported not notifiable.

[1] Includes cases reported as salmonellosis.

## Reported Cases of Selected Communicable Diseases: United States, Each Division and State, 1950—Continued

[Numbers under headings are category numbers of the Sixth Revision of the International Lists, 1948]

| Area | Typhus fever, endemic (101) | Venereal diseases: Total syphilis (020–029) | Venereal diseases: Gonorrhea (030–035) | Venereal diseases: Chancroid (036) | Venereal diseases: Granuloma Inquinale (038) | Venereal diseases: Lymphogranuloma (037) | Whooping cough (056) |
|---|---|---|---|---|---|---|---|
| **New England** | ------- | **3.559** | **3.419** | **24** | **4** | **9** | **15.549** |
| Maine | ------- | 398 | 304 | 3 | 0 | 0 | 1,964 |
| New Hampshire | ------- | 182 | 86 | 0 | 0 | 1 | 400 |
| Vermont | ------- | 191 | 128 | 0 | 0 | 0 | 1,784 |
| Massachusetts | ------- | 1,265 | 1,927 | 11 | 2 | 5 | 5,639 |
| Rhode Island | ------- | 692 | 221 | 0 | 0 | 0 | 1,987 |
| Connecticut | ------- | 831 | 753 | 10 | 2 | 3 | 3,775 |
| **Middle Atlantic** | **7** | **40.088** | **34,047** | **343** | **141** | **244** | **20.387** |
| New York | 6 | 25,536 | 19,621 | 229 | 79 | 178 | 7,560 |
| New Jersey | ------- | 5,838 | 3,933 | 23 | 14 | 21 | 6,206 |
| Pennsylvania | 1 | 8,714 | 10,493 | 91 | 48 | 45 | 6,621 |
| **East North Central** | ------- | **40.254** | **41.820** | **657** | **63** | **136** | **28.071** |
| Ohio | ------- | 13,886 | 8,919 | 54 | 12 | 16 | 7,334 |
| Indiana | ------- | 4,144 | 2,615 | 14 | 2 | 3 | 1,737 |
| Illinois | ------- | 11,247 | 20,879 | 383 | 32 | 88 | 3,341 |
| Michigan | ------- | 8,822 | 8,678 | 202 | 17 | 29 | 9,184 |
| Wisconsin | ------- | 2,155 | 729 | 4 | 0 | 0 | 6,475 |
| **West North Central** | ------- | **12.269** | **8.416** | **68** | **19** | **10** | **6.174** |
| Minnesota | ------- | 836 | 848 | 1 | 0 | 0 | 1,356 |
| Iowa | ------- | 1,953 | 754 | 1 | 0 | 0 | 1,160 |
| Missouri | ------- | 5,720 | 4,485 | 47 | 16 | 9 | 1,356 |
| North Dakota | ------- | 254 | 122 | 0 | 0 | 0 | 333 |
| South Dakota | ------- | 322 | 209 | 2 | 0 | 0 | 168 |
| Nebraska | ------- | 830 | 736 | 13 | 2 | 0 | 302 |
| Kansas | ------- | 2,354 | 1,262 | 4 | 1 | 1 | 1,499 |
| **South Atlantic** | **228** | **46.822** | **86.669** | **2.230** | **1.027** | **490** | **13.190** |
| Delaware | ------- | 638 | 261 | 1 | 2 | 3 | 263 |
| Maryland | 1 | 4,376 | 8,097 | 125 | 40 | 35 | 2,272 |
| District of Columbia | ------- | 3,078 | 13,500 | 535 | 37 | 26 | 188 |
| Virginia | 4 | 4,998 | 9,806 | 99 | 57 | 69 | 2,822 |
| West Virginia | 1 | 2,896 | 3,499 | 36 | 7 | 0 | 2,342 |
| North Carolina | 9 | 5,095 | 14,282 | 250 | 81 | 90 | 3,304 |
| South Carolina | 14 | 5,871 | 8,682 | 123 | 105 | 21 | 475 |
| Georgia | 165 | 9,156 | 14,501 | 818 | 252 | 212 | 1,053 |
| Florida | 34 | 10,714 | 14,041 | 243 | 446 | 34 | 471 |
| **East South Central** | **158** | **26.744** | **42.240** | **567** | **228** | **187** | **5.294** |
| Kentucky | 1 | 3.198 | 4,351 | 15 | 7 | 1 | 1,958 |
| Tennessee | 12 | 5,213 | 20,867 | 172 | 48 | 54 | 1,866 |
| Alabama | 130 | 6,982 | 4,248 | 146 | 90 | 27 | 1,219 |
| Mississippi | 15 | 11,351 | 12,774 | 234 | 83 | 105 | 251 |
| **West South Central** | **288** | **31.121** | **45.020** | **583** | **269** | **210** | **14.778** |
| Arkansas | 3 | 7,283 | 4,155 | 63 | 19 | 42 | 2,011 |
| Louisiana | 62 | 9,487 | 11,099 | 310 | 184 | 64 | 223 |
| Oklahoma | 1 | 3,129 | 5,125 | 76 | 8 | 9 | 928 |
| Texas | 222 | 11,222 | 24,641 | 134 | 58 | 95 | 11,616 |
| **Mountain** | **1** | **5,103** | **4.494** | **45** | **4** | **4** | **6.526** |
| Montana | 1 | 219 | 163 | 1 | 0 | 0 | 614 |
| Idaho | ------- | 352 | 401 | 6 | 0 | 0 | 720 |
| Wyoming | ------- | 202 | 106 | 0 | 0 | 0 | 120 |
| Colorado | ------- | 726 | 1,073 | 6 | 1 | 2 | 1,134 |
| New Mexico | ------- | 1,068 | 697 | 14 | 0 | 1 | 994 |
| Arizona | ------- | 1,984 | 1,673 | 15 | 2 | 1 | 2,093 |
| Utah | ------- | 188 | 119 | 0 | 0 | 0 | 727 |
| Nevada | ------- | 364 | 262 | 3 | 1 | 0 | 124 |
| **Pacific** | **4** | **11.599** | **20.630** | **489** | **24** | **137** | **10.188** |
| Washington | ------- | 779 | 1,613 | 132 | 0 | 2 | 2,142 |
| Oregon | ------- | 525 | 614 | 22 | 0 | 0 | 1,419 |
| California | 4 | 10,295 | 18,403 | 335 | 24 | 135 | 6,627 |
| Total 1950 | 686 | 217,559 | 286,755 | 5,006 | 1,779 | 1,427 | 120,157 |
| Total 1949 | 983 | 256,541 | 318,032 | 6,744 | 2,402 | 1,925 | 69,377 |
| Median 1945–49 | 1,901 | 349,065 | 345,501 | 7,661 | 2,354 | 2,526 | 108,718 |
| Alaska | ------- | 202 | 668 | 0 | 0 | 0 | 128 |
| Hawaii | 10 | 310 | 444 | 5 | 0 | 0 | 35 |
| Panama Canal Zone | 4 | 301 | 535 | 15 | 1 | 1 | 199 |
| Puerto Rico | 25 | 8,491 | 6,988 | 49 | 4 | 15 | 2,694 |
| Virgin Islands | ------- | 105 | 106 | 0 | 0 | 5 | 164 |

Dengue (090): Georgia 1, Mississippi 1, Texas 23, Virginia 3.

Diarrhea of the newborn (764): California 135, Connecticut 3, Florida 65, Illinois 137, Indiana 9, Iowa 2, Kansas 2, Maryland 8, Michigan 14, Minnesota 10, New Jersey 1, New Mexico 22, New York 18, North Dakota 5, Ohio 110, Oklahoma 8, Pennsylvania 19, Rhode Island 6, South Carolina 31, Washington 4, West Virginia 13.

Erysipelas (052): Arizona 1, Arkansas 6, Colorado 3, Connecticut 25, Florida 15, Idaho 17, Illinois 148, Indiana 11, Kansas 7, Kentucky 4, Louisiana 4, Maryland 3, Michigan 91, Minnesota 5, Missouri 12, Montana 4, Nebraska 2, Nevada 2, New Mexico 1, North Dakota 9, Ohio 21, Oregon 34, Pennsylvania 45, South Dakota 1, Tennessee 28, Vermont 1, Wisconsin 31, Wyoming 2, Alaska 3, Hawaii 6.

Favus (131 part): Missouri 4, Nevada 4.

Food poisoning (049): California 1,322, Colorado 2, Connecticut 84, Florida 30, Idaho 65, Illinois 252, Indiana 51, Iowa 2, Kansas 1, Kentucky 106, Louisiana 12, Maine 1, Minnesota 76, Nevada 165, New Jersey 5, New Mexico 156, New York 988, Ohio 56, Oklahoma 57, Oregon 18, Pennsylvania 300, Utah 3, Washington 10, Alaska 30, Panama Canal Zone 218.

Glandular fever (infectious mononucleosis) (093): Arizona 40, Connecticut 184, Idaho 27, Kentucky 33, Maryland 21, Michigan 140, Minnesota 406, Montana 1, Nebraska 40, New Hampshire 1, Ohio 2, Oklahoma 9, Pennsylvania 14, Tennessee 67, Washington 52, Alaska 1.

Impetigo (695, 766): Colorado 57, Connecticut 12, Idaho 51, Illinois 15, Indiana 25, Iowa 6, Kansas 23, Kentucky 95, Maryland 2, Michigan 1,027, Missouri 39, Montana 24, Nevada 133, New York 100, North Dakota 9, Ohio 136, Rhode Island 1, Washington 248, Wyoming 2, Alaska 15, Hawaii 169.

Leprosy (060): California 9, Connecticut 1, Florida 3, Illinois 1, Louisiana 2, Missouri 1, New Jersey 1, New York 8, Oregon 1, Texas 16, Hawaii 34, Panama Canal Zone 4.

Ophthalmia neonatorum (033, 765): Arizona 7, Arkansas 4, California 7, Connecticut 2, Florida 22, Georgia 4, Illinois 128, Louisiana 6, Maryland 3, Massachusetts 167, Michigan 23, Mississippi 35, New Jersey 6, New Mexico 5, New York 23, Ohio 535, Pennsylvania 8, South Carolina 4, Tennessee 13, Texas 75, West Virginia 87, Wisconsin 4.

Pellagra (281): Alabama 21, Arizona 4, Arkansas 14, Georgia 67, Louisiana 1, Nevada 2, New Mexico 4, Oklahoma 10, Tennessee 34, Virginia 6, Virgin Islands 2.

Plague (058): Arizona 1, New Mexico 2.

Psittacosis (096.2): California 10, Indiana 1, Louisiana 1, Massachusetts 1, Michigan 4, New York 2, Ohio 3.

Rabies (094): Arizona 1, Arkansas 1, Indiana 1, Missouri 1, Pennsylvania 3, Tennessee 4, West Virginia 1.

Relapsing fever (071): California 4, Nevada 10, Oregon 2, Texas 18, Panama Canal Zone 1.

Rickettsialpox (108): New York City 115.

Ringworm of the scalp (131 part): Arkansas 3, Connecticut 79, Florida 6, Georgia 97, Illinois 1,406, Indiana 130, Iowa 232, Kansas 99, Kentucky 160, Maryland 1, Minnesota 18, Missouri 40, Montana 4, Nevada 38, New Mexico 1, Ohio 149, Oklahoma 44, Oregon 137, Pennsylvania 32, South Carolina 68, Utah 31, Virginia 245, Washington 897.

Scabies (135): Idaho 60, Indiana 17, Kansas 33, Kentucky 255, Maryland 6, Michigan 642, Missouri 24, Montana 7, Nevada 54, North Dakota 19, Ohio 57, Pennsylvania 330, Wyoming 3, Alaska 26.

Schistosomiasis (123): New York 73.

Vincent's infection (070): Colorado 125, Florida 96, Georgia 49, Idaho 33, Illinois 80, Indiana 11, Kansas 41, Kentucky 32, Maryland 18, Montana 3, Nevada 52, New Hampshire 9, Ohio 12, Oklahoma 103, Rhode Island 1, South Dakota 8, Tennessee 73, Vermont 116, Washington 121, Wyoming 1.

Weil's Disease (072): California 3, Louisiana 1, Massachusetts 1, Michigan 15, Montana 1, New York 1, Ohio 2, Pennsylvania 2, Tennessee 1.

* * * * * * *

Rabies in Animals: Alabama 331, Arizona 10, Arkansas 120, California 100, Colorado 130, Florida 31, Georgia 390, Illinois 106, Indiana 520, Iowa 372, Kansas 48, Kentucky 617, Louisiana 22, Michigan 225, Minnesota 15, Mississippi 62, New Jersey 5, New Mexico 5, New York 1,013, Ohio 306, Oklahoma 125, Pennsylvania 95, South Carolina 324, Tennessee 256, Texas 1,174, Virginia 94, Washington 1, West Virginia 242, Wisconsin 14.

# Incidence of Disease

*No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring*

## UNITED STATES

### Reports From States for Week Ending May 5, 1951

*Rocky Mountain Spotted Fever*

Rocky Mountain spotted fever in the Mountain and Pacific States in the past has appeared in March and has reached a peak in May or June. In the 5-year period, 1933–37, the average number of cases reported in March was 11 and in April, 45. In the 5-year period, 1940–44, the average number of cases in March and April was 6 and 29 cases, respectively. In March of the present year, only 1 case was reported and in April none were reported in these groups of States. The disease appears and reaches a peak 1 to 2 months later in the eastern part of the country.

*Measles*

Measles incidence continues to be higher than for the same period last year. For the current week there were 24,611 cases as compared with 14,452 for the same week last year. The cumulative total for the first 18 weeks of 1951 is 294,061 compared with 160,816 for the same period of 1950.

### Epidemiological Reports

*"Water Hemlock" Poisoning*

Dr. A. S. McCown, Virginia Department of Health, reports the fatal poisoning of three children living in Coeburn, Va., who had eaten water hemlock (*Cicuta maculata*). Three other children were affected but they recovered. The six children, all between 4 and 13 years of age, were reported to have mistaken this plant for wild carrot, which is considered to be edible. The onset of symptoms after ingestion was not accurately determined but was considered to be about 3 to 4 hours. Symptoms in the fatal cases consisted of convulsions and vomiting. The survivors were disoriented for a while in addition to having convulsions and visual disturbances. Poisoning of cattle is known to occur as a result of eating this plant. The roots contain the highest concentration of the active principle, coniine, an alkaloid which produces motor paralysis.

*Gastroenteritis*

Dr. R. M. Albrecht, New York State Department of Health, has reported an outbreak of mild afebrile gastroenteritis in a school in Westchester County. In the investigation made by Dr. E. A. Lane, it was found that 50 pupils and 9 teachers were affected between April 4 and 6. Cases were scattered throughout the school and were confined mainly to those eating in the cafeteria. However, no single food was common to those who became ill. The etiological agent has not been determined.

*Rabies*

The Veterinary Public Health Section of the Iowa Department of Health reported that 373 animals throughout the State were found to have rabies in 1950. There were 164 rabid dogs, 80 skunks, 64 cattle, 31 cats, and 14 hogs. Other animal species in which the disease was recognized were foxes, raccoons, squirrels, horses, ground hogs, rabbits, and ferrets. In the first 3 months of 1951, 142 rabid animals were reported in 53 of the counties in the State, all confirmed by laboratory examination. There were 14 additional cases reported on the basis of history and clinical manifestations.

*Comparative Data for Cases of Specified Reportable Diseases: United States*

[Numbers after diseases are International List numbers, 1948 revision]

| Disease | Total for week ended— | | 5-year median 1946–50 | Seasonal low week | Cumulative total since seasonal low week | | 5-year median 1945–46 through 1949–50 | Cumulative total for calendar year— | | 5-year median 1946–50 |
|---|---|---|---|---|---|---|---|---|---|---|
| | May 5, 1951 | May 6, 1950 | | | 1950–51 | 1949–50 | | 1951 | 1950 | |
| Anthrax (062) | 2 | 2 | 1 | (1) | (1) | (1) | (1) | 28 | 11 | 18 |
| Diphtheria (055) | 45 | 89 | 158 | 27th | 4,422 | 6,819 | 9,833 | 1,515 | 2,548 | 3,475 |
| Encephalitis, acute infectious (082) | 12 | 12 | 12 | (1) | (1) | (1) | (1) | 275 | 236 | 153 |
| Influenza (480–483) | 1,711 | 2,162 | 1,375 | 30th | 124,931 | 143,004 | 143,004 | 110,389 | 132,420 | 124,578 |
| Measles (085) | 24,611 | 14,452 | 27,787 | 35th | 322,762 | 179,946 | 369,886 | 294,061 | 160,816 | 334,940 |
| Meningitis, meningococcal (057.0) | 75 | 86 | 79 | 37th | 2,860 | 2,616 | 2,568 | 1,899 | 1,702 | 1,596 |
| Pneumonia (490–493) | 1,452 | 2,366 | (2) | (1) | (1) | (1) | (1) | [3] 34,840 | 45,219 | (2) |
| Poliomyelitis, acute (080) | 70 | 72 | 60 | 11th | 411 | 450 | 321 | 1,623 | 1,581 | 808 |
| Rocky Mountain spotted fever (104) | 6 | 6 | 7 | (1) | (1) | (1) | (1) | 13 | 24 | 24 |
| Scarlet fever (050) [4] | 1,938 | 1,407 | 1,985 | 32d | 56,204 | 47,134 | 70,008 | 40,513 | 30,695 | 47,007 |
| Small pox (084) | ------- | ------- | 2 | 35th | 13 | 41 | 65 | 5 | 20 | 44 |
| Tularemia (059) | 17 | 17 | 15 | (1) | (1) | (1) | (1) | 250 | 363 | 363 |
| Typhoid and paratyphoid [5] fever (040, 041) | 48 | 41 | 53 | 11th | 285 | 290 | 335 | 720 | 800 | 820 |
| Whooping cough (056) | 1,415 | 2,691 | 2,073 | 39th | 49,938 | 68,646 | 68,046 | 28,336 | 47,110 | 38,450 |

[1] Not computed. [2] Data not available. [3] Additions for week ended Apr. 21: Florida, 16 cases; Tennessee, 76. [4] Including cases reported as streptococcal sore throat. [5] Including cases reported as salmonellosis

## Reported Cases of Selected Communicable Diseases: United States, Week Ended May 5, 1951

[Numbers under diseases are International List numbers, 1948 revision]

| Area | Diphtheria (055) | Encephalitis, infectious (082) | Influenza (480–483) | Measles (085) | Meningitis, meningococcal (057.0) | Pneumonia (490–493) | Poliomyelitis (080) |
|---|---|---|---|---|---|---|---|
| **United States** | **45** | **12** | **1,711** | **24,611** | **75** | **1,452** | **70** |
| **New England** | **3** | **1** | **24** | **831** | **2** | **49** | |
| Maine | | | 22 | 15 | | 26 | |
| New Hampshire | | | 2 | 15 | | 1 | |
| Vermont | | | | 123 | | | |
| Massachusetts | 3 | 1 | | 489 | | | |
| Rhode Island | | | | 12 | | 1 | |
| Connecticut | | | | 177 | 2 | 21 | |
| **Middle Atlantic** | **7** | **5** | **7** | **3,414** | **13** | **129** | **9** |
| New York | 4 | 4 | [1] 2 | 1,122 | 8 | 46 | 4 |
| New Jersey | 1 | 1 | 5 | 742 | 1 | 45 | 4 |
| Pennsylvania | 2 | | | 1,550 | 4 | 38 | 1 |
| **East North Central** | **6** | **4** | **14** | **4,528** | **15** | **130** | **3** |
| Ohio | 4 | | | 1,263 | 3 | | |
| Indiana | 2 | 1 | 1 | 146 | 2 | 6 | |
| Illinois | | 1 | 12 | 880 | 6 | 70 | 3 |
| Michigan | | 2 | 1 | 627 | 1 | 54 | |
| Wisconsin | | | | 1,612 | 3 | | |
| **West North Central** | **4** | **1** | **52** | **1,668** | **6** | **105** | **9** |
| Minnesota | 1 | | 1 | 118 | | 13 | 3 |
| Iowa | | | | 216 | 1 | | 2 |
| Missouri | 1 | | 7 | 215 | 3 | 3 | 1 |
| North Dakota | | | 44 | 73 | 1 | 84 | 2 |
| South Dakota | | 1 | | 40 | | 1 | |
| Nebraska | | | | 65 | | | 1 |
| Kansas | 2 | | | 941 | 1 | 4 | |
| **South Atlantic** | **6** | **1** | **476** | **2,003** | **12** | **410** | **10** |
| Delaware | | | | 26 | 2 | | |
| Maryland | | | 3 | 104 | 1 | 28 | |
| District of Columbia | | | | 56 | | 8 | 1 |
| Virginia | 2 | | 354 | 657 | 1 | 71 | |
| West Virginia | 1 | | | 387 | | | |
| North Carolina | 3 | | | 179 | 3 | | 1 |
| South Carolina | | | 19 | 30 | | 2 | 1 |
| Georgia | | 1 | 100 | 304 | 3 | 301 | 1 |
| Florida | | | | 170 | 2 | | 6 |
| **East South Central** | **7** | | **300** | **949** | **8** | **109** | **5** |
| Kentucky | 1 | | 27 | 420 | 4 | 28 | 1 |
| Tennessee | 1 | | 224 | 259 | 2 | | |
| Alabama | 3 | | | 227 | 2 | 40 | 2 |
| Mississippi | 2 | | 49 | 43 | | 41 | 2 |
| **West South Central** | **9** | | **589** | **4,466** | **12** | **362** | **12** |
| Arkansas | | | 386 | 360 | 2 | 43 | 1 |
| Louisiana | 1 | | 4 | 33 | 1 | 40 | 4 |
| Oklahoma | 1 | | 199 | 525 | 2 | 51 | |
| Texas | 7 | | | 3,548 | 7 | 228 | 7 |
| **Mountain** | **1** | | **203** | **1,212** | **1** | **75** | **6** |
| Montana | | | 17 | 27 | 1 | | |
| Idaho | | | | 135 | | | |
| Wyoming | 1 | | | 102 | | | 1 |
| Colorado | | | 5 | 295 | | 11 | |
| New Mexico | | | 6 | 127 | | 32 | 3 |
| Arizona | | | 175 | 447 | | 32 | 2 |
| Utah | | | | 76 | | | |
| Nevada | | | | 3 | | | |
| **Pacific** | **2** | | **46** | **5,540** | **6** | **83** | **16** |
| Washington | | | 8 | 1,070 | 4 | | 2 |
| Oregon | 1 | | 9 | 746 | | 15 | |
| California | 1 | | 29 | 3,724 | 2 | 68 | 14 |
| Alaska | | | | | | | |
| Hawaii | | | 3 | 3 | | | |

[1] New York City only.
*Anthrax:* New York and Pennsylvania, 1 case each.

## Reported Cases of Selected Communicable Diseases: United States, Week Ended May 5, 1951—Continued

[Numbers under diseases are International List numbers, 1948 revision]

| Area | Rocky Mountain spotted fever (104) | Scarlet fever (050) | Smallpox (084) | Tularemia (059) | Typhoid and paratyphoid fever [1] (040, 041) | Whooping cough (056) | Rabies in animals |
|---|---|---|---|---|---|---|---|
| **United States** | 6 | 1,938 | | 17 | 48 | 1,415 | 148 |
| **New England** | | 166 | | | 2 | 90 | |
| Maine | | 19 | | | 1 | 36 | |
| New Hampshire | | [2] 6 | | | | 4 | |
| Vermont | | 5 | | | | 8 | |
| Massachusetts | | 115 | | | | 38 | |
| Rhode Island | | 8 | | | | 2 | |
| Connecticut | | 13 | | | 1 | 2 | |
| **Middle Atlantic** | 1 | 313 | | 2 | 5 | 172 | 8 |
| New York | | [2] 166 | | 2 | | 61 | 8 |
| New Jersey | 1 | 42 | | | 1 | 64 | |
| Pennsylvania | | 105 | | | 4 | 47 | |
| **East North Central** | | 695 | | 3 | 3 | 199 | 25 |
| Ohio | | 222 | | | 1 | 32 | 4 |
| Indiana | | 24 | | | | 39 | 9 |
| Illinois | | 74 | | 3 | 2 | 24 | 4 |
| Michigan | | 305 | | | | 40 | 8 |
| Wisconsin | | 70 | | | | 64 | |
| **West North Central** | | 113 | | 2 | 2 | 38 | 27 |
| Minnesota | | 13 | | | | 2 | 3 |
| Iowa | | 15 | | | | 8 | 17 |
| Missouri | | 50 | | 1 | | 6 | 7 |
| North Dakota | | 2 | | | | 3 | |
| South Dakota | | 6 | | | 2 | 1 | |
| Nebraska | | 5 | | | | 2 | |
| Kansas | | 22 | | 1 | | 16 | |
| **South Atlantic** | 1 | 119 | | 3 | 6 | 185 | 20 |
| Delaware | | | | 1 | | 5 | |
| Maryland | | 13 | | | | 12 | |
| District of Columbia | | 7 | | | | 10 | |
| Virginia | | 21 | | | 2 | 40 | 4 |
| West Virginia | | [2] 14 | | | | | 1 |
| North Carolina | 1 | 33 | | | 1 | 55 | |
| South Carolina | | 2 | | 2 | | 1 | 8 |
| Georgia | | 13 | | | 3 | 42 | 7 |
| Florida | | [2] 16 | | | | 20 | |
| **East South Central** | | 45 | | | 9 | 122 | 30 |
| Kentucky | | 18 | | | 1 | 13 | 13 |
| Tennessee | | 23 | | | 2 | 32 | 10 |
| Alabama | | 3 | | | 3 | 55 | |
| Mississippi | | 1 | | | 3 | 22 | 7 |
| **West South Central** | 1 | 77 | | 4 | 8 | 372 | 36 |
| Arkansas | | 4 | | 1 | 2 | 30 | 3 |
| Louisiana | | 6 | | 1 | 2 | 7 | |
| Oklahoma | | 16 | | | | 16 | 3 |
| Texas | 1 | 51 | | 2 | 4 | 319 | 30 |
| **Mountain** | 1 | 93 | | 3 | 4 | 141 | |
| Montana | | 3 | | | | 18 | |
| Idaho | | 8 | | | | | |
| Wyoming | | 2 | | | | 10 | |
| Colorado | | 4 | | | | 15 | |
| New Mexico | | 2 | | | 2 | 36 | |
| Arizona | | 12 | | | 1 | 55 | |
| Utah | | [2] 62 | | 3 | 1 | 7 | |
| Nevada | 1 | | | | | | |
| **Pacific** | 2 | 317 | | | 9 | 96 | 2 |
| Washington | 1 | 54 | | | | 30 | 2 |
| Oregon | 1 | 29 | | | 3 | 5 | |
| California | | [2] 234 | | | 6 | 61 | |
| Alaska | | | | | | 2 | |
| Hawaii | | | | | | | |

[1] Including cases reported as salmonellosis.
[2] Including cases reported as streptococcal sore throat.

# FOREIGN REPORTS

## CANADA

### Reported Cases of Certain Diseases

*Week Ended April 14, 1951*

| Disease | Total | Newfoundland | Prince Edward Island | Nova Scotia | New Brunswick | Quebec | Ontario | Manitoba | Saskatchewan | Alberta | British Columbia |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Brucellosis | 2 | | | | | 1 | | 1 | | | |
| Chickenpox | 934 | 1 | | 28 | | 163 | 420 | 50 | 13 | 104 | 155 |
| Diphtheria | 3 | | | | | 2 | | 1 | | | |
| Dysentery, bacillary | 7 | | | | | 2 | 3 | | | | 2 |
| German measles | 541 | | | 156 | | 26 | 218 | 3 | 9 | 45 | 84 |
| Influenza | 298 | | | 25 | 9 | | 6 | 34 | | | 224 |
| Measles | 1,336 | 6 | | 37 | 6 | 251 | 792 | 90 | 1 | 78 | 75 |
| Meningitis, meningococcal | 10 | 5 | | | | | 3 | 2 | | | |
| Mumps | 1,025 | 1 | | 12 | | 261 | 356 | 49 | 50 | 129 | 167 |
| Scarlet fever | 299 | | | 2 | | 105 | 61 | 11 | 8 | 50 | 62 |
| Tuberculosis (all forms) | 230 | 10 | | 9 | 25 | 58 | 41 | 25 | 7 | | 55 |
| Typhoid and paratyphoid fever | 8 | | | | 1 | 4 | 2 | | | | 1 |
| Venereal diseases: | | | | | | | | | | | |
| Gonorrhea | 310 | 4 | | 9 | 9 | 56 | 54 | 23 | 19 | 49 | 87 |
| Syphilis | 104 | 3 | | 5 | 7 | 56 | 17 | | 6 | 1 | 9 |
| Primary | 8 | | | | | 5 | 3 | | | | |
| Secondary | 9 | | | 1 | 1 | 4 | 1 | | 2 | | |
| Other | 87 | 3 | | 4 | 6 | 47 | 13 | | 4 | 1 | 9 |
| Whooping cough | 177 | 7 | | 1 | | 27 | 71 | 17 | 2 | 9 | 43 |

*Week Ended April 21, 1951*

| Disease | Total | Newfoundland | Prince Edward Island | Nova Scotia | New Brunswick | Quebec | Ontario | Manitoba | Saskatchewan | Alberta | British Columbia |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Brucellosis | 6 | | | | | 3 | 2 | | | | 1 |
| Chickenpox | 806 | 2 | | 33 | | 130 | 405 | 27 | 17 | 43 | 149 |
| Diphtheria | 6 | | | | | 5 | | | | 1 | |
| Dysentery, bacillary | 3 | | | | | 2 | | | | | 1 |
| Encephalitis, infectious | 1 | | | | | | | | 1 | | |
| German measles | 493 | 1 | | 175 | | 24 | 176 | | 10 | 20 | 87 |
| Influenza | 126 | | | 20 | 11 | | 5 | 59 | | | 31 |
| Measles | 1,380 | 5 | | 86 | 7 | 262 | 665 | 114 | 12 | 106 | 123 |
| Meningitis, meningococcal | 4 | | | 1 | | 1 | | | 1 | | 1 |
| Mumps | 789 | 1 | | 14 | | 224 | 298 | 39 | 47 | 67 | 99 |
| Scarlet fever | 289 | 1 | | | | 91 | 48 | 30 | 15 | 45 | 59 |
| Tuberculosis (all forms) | 181 | 10 | | 3 | 17 | 81 | 28 | 15 | 2 | 9 | 16 |
| Typhoid and paratyphoid fever | 15 | | | | | 7 | 1 | 1 | | | 6 |
| Venereal diseases: | | | | | | | | | | | |
| Gonorrhea | 261 | 6 | | 6 | 2 | 51 | 27 | 16 | 10 | 42 | 101 |
| Syphilis | 114 | 3 | | 12 | 1 | 57 | 19 | 5 | 5 | | 12 |
| Primary | 7 | | | 2 | | 2 | 2 | | | | 1 |
| Secondary | 8 | | | | 1 | 3 | 2 | 1 | | | 1 |
| Other | 99 | 3 | | 10 | | 52 | 15 | 4 | 5 | | 10 |
| Whooping cough | 174 | | | | | 89 | 33 | 10 | 2 | 9 | 31 |

## MADAGASCAR

*Reported Cases of Certain Diseases and Deaths—January 1951*

| Disease | Aliens | | Natives | |
|---|---|---|---|---|
| | Cases | Deaths | Cases | Deaths |
| Beriberi | 1 | | 2 | |
| Bilharziasis | | | 31 | |
| Diphtheria | 4 | | 8 | 2 |
| Dysentery: | | | | |
| Amebic | 1 | | 110 | |
| Bacillary | 1 | | 1 | |
| Influenza | 12 | | 1,921 | 5 |
| Leprosy | | | 26 | 3 |
| Malaria | 94 | 2 | 31,363 | 107 |
| Measles | 6 | | 98 | |
| Mumps | | | 75 | |
| Plague | | | 64 | 47 |
| Pneumonia (all forms) | 4 | | 502 | 42 |
| Puerperal infection | | | 5 | 2 |
| Relapsing fever | | | 1 | |
| Tuberculosis, respiratory | 11 | 2 | 176 | 14 |
| Typhoid fever | | | 7 | 4 |
| Whooping cough | 7 | | 388 | 1 |

## WORLD DISTRIBUTION OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER

The following tables are not complete or final for the list of countries included or for the figures given. Since many of the figures are from weekly reports, the accumulated totals are for approximate dates.

### CHOLERA

(Cases)

| Place | January-February 1951 | March 1951 | April 1951—week ended— | | | |
|---|---|---|---|---|---|---|
| | | | 7 | 14 | 21 | 28 |
| **ASIA** | | | | | | |
| Burma | 484 | 119 | 81 | 118 | [1] 63 | [1] 78 |
| Akyab | 7 | | | | | |
| Bassein | 78 | [2] 11 | 8 | 12 | 53 | 66 |
| Moulmein | 1 | 86 | 36 | 28 | 8 | 9 |
| Rangoon | 10 | 1 | | 6 | 2 | 3 |
| India | 20,670 | 7,971 | [1] 167 | [1] 211 | [1] 223 | [1] 327 |
| Bombay | 1 | | | | 1 | |
| Calcutta | 565 | 628 | 160 | 203 | 210 | 322 |
| Cuddalore | 3 | 4 | | | | |
| Madras | 88 | 30 | 2 | 8 | 11 | 5 |
| Nagpur | 58 | 9 | | | 1 | |
| Negapatam | 68 | 19 | | | | |
| Tiruchirappali | 71 | 29 | | | | |
| Tuticorin | 23 | 6 | 5 | | | |
| India (French): | | | | | | |
| Karikal | 32 | 4 | | | | |
| Pondicherry | 67 | [3] 71 | | | | |
| Indochina: | | | | | | |
| Cambodia | 30 | 5 | | | [3] 2 | |
| Viet Nam | 4 | 3 | 7 | 3 | | |
| Cantho | | | 2 | | | |
| Haiphong | 3 | | | | | |
| Soc Trang | 1 | 1 | | | | |
| Pakistan | 3,033 | 2,067 | 251 | 236 | [1] 5 | [1] 4 |
| Chittagong | 1 | 10 | 4 | 2 | 5 | 4 |
| Dacca | 18 | 14 | 3 | 4 | | |
| Thailand | | | | | 1 | |

[1] Preliminary. [2] Including imported cases. [3] Suspected.

## PLAGUE

(Cases)

| Place | January–February 1951 | March 1951 | April 1951—week ended— 7 | 14 | 21 | 28 |
|---|---|---|---|---|---|---|
| AFRICA | | | | | | |
| Belgian Congo | 3 | 7 | 1 | | | |
| Stanleyville Province | 3 | 7 | 1 | | | |
| British East Africa: | | | | | | |
| Tanganyika | | 19[1] | | | | |
| Madagascar | 86 | 23 | | 3[2] | 9[3] | |
| Union of South Africa | 1 | | 6 | | | |
| Orange Free State | 1 | | 6 | | | |
| ASIA | | | | | | |
| Burma | 150 | 45 | 6 | 1 | | |
| Rangoon | | | | 1[4] | | |
| Tavoy | | 2 | | | | |
| India | 2,546 | 1,950 | 20[5] | 35[5] | 20[5] | 19[5] |
| Allahabad | 4[4] | 32[4] | 12[4] | 34[4] | 16[4] | 11[4] |
| Bombay | | 1[4] | | | | |
| Calcutta | | 2 | 3 | 1 | 2 | 8 |
| Cawnpore | | 2 | 5[4] | | 1[4] | |
| Lucknow | 3[4] | 9[6] | | | | |
| Nagpur | | 10 | | | 1 | |
| Indochina: | | | | | | |
| Cambodia | | 6 | | 1 | | |
| Pnom Penh | | 6 | | 1 | | |
| Viet Nam | 16 | 4 | 3 | 5 | 3 | 9 |
| Phanthiet | 9 | 4 | | 5 | 3 | |
| Indonesia: | | | | | | |
| Java | 4 | | 1 | | | |
| Bandoeng | | | 1 | | | |
| Djakarta | 1[4] | | | | | |
| Jogjakarta | 2 | | | | | |
| Semarang | 1[4] | | | | | |
| Madura | | | | | 12[1] | |
| Thailand | 7 | | | | | |
| SOUTH AMERICA | | | | | | |
| Ecuador | 6 | 2 | | | | |
| Chimborazo Province | 6 | 2 | | | | |

[1] Includes suspected cases. [2] Apr. 1–10, 1951. [3] Apr. 11–20, 1951. [4] Imported. [5] Preliminary figure. [6] Includes imported cases.

## SMALLPOX

(Cases)

| | | | | | | |
|---|---|---|---|---|---|---|
| AFRICA | | | | | | |
| Algeria | 16 | 22 | | | | |
| Bechuanaland | 80 | | | | | |
| Belgian Congo | 306 | 375 | 71 | 57 | 37 | |
| British East Africa: | | | | | | |
| Kenya | 1 | | | | | |
| Nyasaland | 13 | 9 | 1 | 12 | | |
| Tanganyika | 90 | 12 | | | | |
| Cameroon (British) | 4 | | | | | |
| Cameroon (French) | 50 | 14 | | 6[1] | 1[2] | |
| Egypt | | 1 | | | | |
| Ethiopia | 5 | | | | | |
| French Equatorial Africa | 28 | 17 | | 5[1] | | |
| French West Africa | 719 | 426 | | 139 | 5 | |
| Dahomey | 229 | 61 | | 8[1] | 5[2] | |
| Guinea | 7 | 2 | | | | |
| Ivory Coast | 49 | 53 | | 46[1] | | |
| Niger Territory | 138 | 82 | | 17[1] | | |
| Senegal | | 2 | | | | |
| Sudan | 214 | 143 | | 54[1] | | |
| Upper Volta | 82 | 83 | | 14[1] | | |
| Gambia | | 1 | | | | |
| Gold Coast | 265 | 39 | 13 | 6 | | |
| Morocco (French) | 5 | 1 | | | | |
| Mozambique | 45 | 38 | | | | |
| Nigeria | 2,278 | 388 | | | | |
| Rhodesia: | | | | | | |
| Southern | 210 | 27 | | | | |

## SMALLPOX—Continued

(Cases)

| Place | January–February 1951 | March 1951 | April 1951—week ended— | | | |
|---|---|---|---|---|---|---|
| | | | 7 | 14 | 21 | 28 |
| AFRICA—continued | | | | | | |
| Sierra Leone | 2 | 1 | | | | |
| Sudan (Anglo-Egyptian) | 12 | 4 | | 1 | | |
| Togo (French) | 21 | 9 | | | | |
| Tunisia | | 1 | | | | |
| Union of South Africa | 269 | | | | | |
| ASIA | | | | | | |
| Arabia | | 2 | | | | |
| Aden | | [3] 1 | | | | |
| Oman | | 1 | | | | |
| Afghanistan | 118 | 45 | | | | |
| Burma | 228 | 238 | 29 | 17 | 7 | 2 |
| Ceylon | | 10 | | | 1 | |
| China | 4 | | | | | |
| India | 58,744 | 45,922 | [4] 776 | [4] 454 | [4] 479 | [4] 365 |
| India (French) | 658 | 1,092 | | 141 | | |
| India (Portuguese) | 58 | 44 | | | | |
| Indochina: | | | | | | |
| Cambodia | 55 | 20 | | | | |
| Viet Nam | 34 | 140 | 70 | 48 | 77 | 67 |
| Indonesia: | | | | | | |
| Borneo | 487 | 255 | 102 | 59 | | |
| Java | 77 | 29 | 1 | 8 | 19 | |
| Iran | 134 | 75 | 3 | 2 | | 7 |
| Iraq | 99 | 12 | | 5 | 4 | 1 |
| Japan | 16 | 7 | | | | |
| Pakistan | 10,600 | 9,439 | 209 | 20 | 4 | 14 |
| Straits Settlements | 1 | | | | | |
| Thailand | 26 | 6 | | | 1 | |
| Turkey | | | | | | [5] 120 |
| EUROPE | | | | | | |
| Great Britain: | | | | | | |
| England: | | | | | | |
| Brighton | 15 | | | | | |
| Portugal | 1 | | | | | |
| Netherlands | | | | | | [6] 19 |
| SOUTH AMERICA | | | | | | |
| British Guiana | 8 | 3 | | | | |
| Colombia | 9 | 11 | | | | |
| Ecuador | 68 | 3 | | | | |
| Paraguay | 7 | | | | | |

[1] Apr. 1–10, 1951. [2] Apr. 11–20, 1951. [3] Imported. [4] Preliminary figure. [5] Mar. 25–Apr. 28, 1951. [6] Date of telegram May 1, 1951.

## TYPHUS FEVER*

(Cases)

| | | | | | | |
|---|---|---|---|---|---|---|
| AFRICA | | | | | | |
| Algeria | 5 | 5 | | | | |
| Belgian Congo | | 1 | | | | |
| British East Africa: | | | | | | |
| Kenya | 8 | | | | | |
| Somaliland | 1 | | | | | |
| Uganda | | 1 | | | | |
| Egypt | 34 | 17 | | | | |
| Eritrea | 4 | 2 | 1 | | 1 | |
| Ethiopia | 141 | 97 | | | | |
| Libya: | | | | | | |
| Cyrenaica | | 1 | | | | |
| Tripolitania | 1 | 1 | | 1 | 1 | |
| Morocco (French) | | 1 | | | | |
| Morocco (Spanish) | 7 | | | | | |
| Tunisis | 1 | | | | | |
| Union of South Africa | 11 | | | | | |

## TYPHUS FEVER—Continued

(Cases)

| Place | January–February 1951 | March 1951 | April 1951—week ended— 7 | 14 | 21 | 28 |
|---|---|---|---|---|---|---|
| **ASIA** | | | | | | |
| Afghanistan | 94 | 65 | | | | |
| India | 12 | 20 | | | | |
| India (Portuguese) | 12 | 13 | | | | |
| Indochina: Viet Nam | 11 | 1 | | 2 | | |
| Iran | 53 | 107 | | 7 | | 13 |
| Iraq | 5 | 9 | | 2 | 5 | 6 |
| Israel | | 2 | | | | |
| Japan | 5 | | | | | |
| Pakistan | 5 | 2 | 3 | | 1 | |
| Syria | | 1 | | | | |
| Transjordan | 1 | 34 | 3 | | | |
| Turkey | 45 | 13 | 3 | 4 | 6 | 3 |
| **EUROPE** | | | | | | |
| Portugal | 1 | 2 | | | | |
| Sicily | 5 | | | | | |
| Yugoslavia | 34 | 32 | | | | |
| **NORTH AMERICA** | | | | | | |
| Costa Rica | | [1] 5 | | | | |
| Guatemala | 1 | | | | | |
| El Salvador | | [1] 4 | | | | |
| Jamaica | [1] 1 | [1] 1 | | [1] 1 | | |
| Mexico | [2] 14 | [2] 15 | | | | |
| **SOUTH AMERICA** | | | | | | |
| Chile | 20 | 21 | 8 | 7 | | |
| Colombia | 17 | 9 | | | | |
| Ecuador | [2] 128 | [2] 32 | | | | |
| Paraguay | 11 | | | | | |
| Venezuela | [1] 2 | | | | | |

*Reports from some areas are probably murine type, while others include both murine and louse-borne types.

[1] Murine. [2] Includes murine type.

## YELLOW FEVER

(C—cases; D—deaths)

| Place | | January–February 1951 | March 1951 | April 1951—week ended— 7 | 14 | 21 | 28 |
|---|---|---|---|---|---|---|---|
| **AFRICA** | | | | | | | |
| Gold Coast | C | 1 | 4 | 2 | [1] 2 | [1] 3 | |
| Accra | C | 1 | 2 | [1] 1 | | | |
| Adeiso | C | | 2 | | [1] 2 | [1] 3 | |
| Nigeria | C | | | | | [1] 1 | |
| Eziachi | C | | | | | [1] 1 | |
| Sierra Leone | C | [1] 1 | [1] 1 | | | | |
| Koinadugu District | C | [1] 1 | [1] 1 | | | | |
| Freetown | C | [1] 1 | [1] 1 | | | | |
| **NORTH AMERICA** | | | | | | | |
| Panama | C | | | | 1 | | |
| Bocas Del Toro Province | C | | | | 1 | | |
| **SOUTH AMERICA** | | | | | | | |
| Brazil | D | [2] 400 | [3] 2 | | | | |
| Goiaz State | D | [3] 14 | [3] 1 | | | | |
| Goiania | D | [3] 1 | [3] 1 | | | | |
| Goiaz | D | [3] 3 | | | | | |
| Niquelandia | D | [3] 3 | | | | | |
| Porangatu | D | [3] 1 | | | | | |
| Uruacu | D | [3] 2 | | | | | |
| Matto Grosso State | D | 2 | | | | | |
| Colombia | D | 12 | 3 | | | | |
| Boyaca Department | D | 1 | | | | | |
| Otanche | D | 1 | | | | | |
| Caqueta Commissary | D | 2 | | | | | |
| Montanita | D | 1 | | | | | |
| Meta Territory | D | | 1 | | | | |

YELLOW FEVER—Continued

(C—cases; D—deaths)

| Place | | January-February 1951 | March 1951 | April 1951—week ended— | | | |
|---|---|---|---|---|---|---|---|
| | | | | 7 | 14 | 21 | 28 |
| SOUTH AMERICA—continued | | | | | | | |
| Colombia—Continued | | | | | | | |
| North Santander Department | D | 4 | 1 | | | | |
| La Vega | D | 3 | | | | | |
| Rionegro | D | 1 | 1 | | | | |
| Santander Department | D | 5 | 1 | | | | |
| Campohermoso | D | 1 | | | | | |
| Guamales | D | 1 | | | | | |
| Maradales | D | 1 | | | | | |
| Tambo Redondo | D | 1 | | | | | |
| Veneoas | D | 1 | | | | | |
| Ecuador | C | 35 | 49 | 1 | | | |
| Quininde | D | | 1 | | | | |
| Santo Domingo de Los Colorados | C | 35 | 48 | | | | |
| San Mequel | D | | | 1 | | | |
| Peru | D | 1 | | | | | |

[1] Suspected. [2] The number of deaths from Dec. 1–Feb. 20, 1951, was estimated to be 400 and the number of cases was estimated to be 2,000. [3] Confirmed deaths.

+ + +

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# Public Health Reports

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TUBERCULOSIS CONTROL ISSUE NO. 64

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FEDERAL SECURITY AGENCY

PUBLIC HEALTH SERVICE

FEDERAL SECURITY AGENCY
*Oscar R. Ewing, Administrator*

PUBLIC HEALTH SERVICE
*Leonard A. Scheele, Surgeon General*

Division of Public Health Methods
*G. St. J. Perrott, Chief of Division*

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# Public Health Reports

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## Tuberculosis Studies in Muscogee County, Georgia

### III. Tuberculosis Mortality Following a Community-Wide X-ray Survey


By GEORGE W. COMSTOCK, M.D., and MARY H. BURKE, M.A.*


As the mortality rate for tuberculosis continues its downward trend, hopes for eventual elimination of the disease are reflected in the changing emphasis placed on various tuberculosis control measures. In the United States in recent years, considerable stress has been placed on photofluorographic chest X-ray surveys of entire communities, and it is probably true that X-ray surveys are more widely advocated and used than any other single tuberculosis control measure. The basic concept of the community-wide X-ray survey is simple, rational, and not radically different from other case-finding procedures long used in tuberculosis prevention programs. The reasoning underlying the use of such procedures is still essentially empirical and largely without specific scientific evidence of immediate or long-range influence on tuberculosis morbidity and mortality.

In an ideal or "perfect" community-wide survey, chest X-ray films of all persons in a community would be made and examined for the purpose of separating the total population into two groups, those who have and those who do not have pulmonary tuberculosis.

Two distinctly different benefits may be expected to accrue from these procedures, both due entirely to the advantages that come because the disease is discovered earlier than it would have been without the survey. First, there is the gain to the newly discovered cases due to the medical supervision and treatment given. Clearly, the value of the survey for the newly found cases depends on the fact that therapeutic procedures appear to be more effective early in the disease in ameliorating the extent of morbidity and in reducing or delaying tuberculosis mortality. Definitive evidence of the extent of


*Surgeon and Biometrician, respectively, Field Research Branch, Division of Chronic Disease and Tuberculosis.



This is the sixty-fourth of a series of special issues of PUBLIC HEALTH REPORTS devoted exclusively to tuberculosis control. The special issues began March 1, 1946, and appear the first week of each month. The articles are reprinted as extracts. Effective with the July 5, 1946, issue, these extracts may be purchased from the Superintendent of Documents, Government Printing Office, Washington, D. C. for 10 cents a single copy. Subscriptions are obtainable at $1.00 per year, $1.25 foreign.

this effect is exceedingly difficult if not impossible to obtain and it is more or less necessary to assume, on the basis of general experience in the treatment of tuberculosis, that the earlier treatment is begun the more effective it is.

The second and empirically the most important value of mass case-finding procedures should accrue because the newly discovered patients may be prevented at an earlier time from further spreading the disease to others. Present knowledge of the contagiousness of human tuberculosis indicates that effective isolation of known cases should be of great importance in reducing morbidity and mortality. Few would question that this should be a major influence in decreasing the rate of infection and subsequently of disease among infants, children, and young adults. However, because a high proportion of the older members of the population have already had a tuberculous infection, we are uncertain what proportion of new disease arising among them could be prevented by the effective isolation of known cases. This uncertainty is rooted in our lack of knowledge of the proportions of apparently new cases of the disease that arise as primary infection, as exogenous reinfection or endogenously. Until the frequency of endogenous tuberculous disease—that which arises from within an individual as a reactivation of a previous infection—is determined, the value of mass X-ray surveys cannot be fully demonstrated nor the problems of the eventual eradication of tuberculosis accurately appraised.

There are many ways in which present day community-wide X-ray surveys fall substantially short of the ideal. In most programs X-ray films are obtained for only a part of the population and it must be granted that there may be relatively fewer cases, as many, or perhaps even more, among those not X-rayed. Additional cases of tuberculosis must be expected in the population that is continuously moving into most communities in this country. Thus, no survey can claim to have identified every person in a community who might benefit by treatment and every individual capable of spreading the disease. Other practical difficulties further reduce the effectiveness of surveys. Few communities can provide all of the tuberculosis services considered desirable and, in addition, some patients fail to take advantage of what is offered. Isolation of all patients known to be infectious is extremely difficult to attain and even then isolation is rarely complete. Not the least of other practical problems arises because the interpretation of X-ray films, the critical and most technical aspect of X-ray surveys, is subject to large variations (*1, 2, 3*).

If both practical and theoretical limitations of community-wide X-ray surveys are considered, it should not be surprising that so little scientific knowledge is yet available of the effects of such surveys on tuberculosis morbidity and mortality.

This paper represents an attempt to estimate the significance of survey case finding in Muscogee County, Ga., a community of about 100,000 persons, by a study of the tuberculosis deaths during a period of 3½ years following a mass X-ray survey in 1946. The number of tuberculosis deaths in this period is too small to allow extensive analyses or definitive conclusions. Nevertheless the data presented do provoke speculation on the reasons for the continued development of fatal tuberculosis among various groups of the population.

Deaths due to tuberculosis are classified according to the major categories into which the survey subdivided the population. In general, this means a separation of persons dying of tuberculosis into those known to have had the disease before the survey, those diagnosed as tuberculous as a result of the survey, those with negative survey chest films, and those not participating in the program. As could be expected, a substantial proportion of the deaths occurred among previously known patients and those first identified as cases in the survey. The most striking result of the study was the estimate, assuming the survey to have been complete, that more than one-third of all fatal tuberculosis in the 3½-year period would not have been detected by the mass survey technique. There was a marked difference in this estimate for whites and Negroes; in the former less than one-fifth and in the latter almost half of the dead would have had negative survey films. In terms of average annual mortality rates per 100,000 persons, 3 whites, and 39 Negroes with negative survey films died of tuberculosis. These and other results reported in the paper, while obviously not constituting a scientific evaluation of the effects of a community-wide survey, furnish useful information on certain aspects of the problems of tuberculosis control.

## Description of Study Program

A research program to study the circumstances associated with the occurrence and spread of tuberculosis in a community was established in Muscogee County, Ga., in 1946, supported by the Muscogee County Health Department, the Georgia State Department of Health and the Division of Chronic Disease and Tuberculosis, Public Health Service. The applicability of this study to a wide variety of problems has been explored in a previous paper (*4*).

Public health tuberculosis work in Muscogee County is unique in that the program represents a cooperative effort to combine an operating tuberculosis service with an extensive investigation of fundamental problems of tuberculosis epidemiology. Service activities of the health department include very careful examination and follow-up of cases and suspected cases; extensive X-ray screening service for the general population; and, most importantly for the research program, a relationship with hospitals and private physicians

which insures that almost 100 percent of even suspected cases of tuberculosis in the community come to the attention of the health department. Special tuberculosis programs for the community have included: the mass X-ray survey and a special census of the population in 1946; tuberculin testing and BCG vaccination of the school-age population in the Spring of 1947; and, in 1950, a combined X-ray, tuberculin testing, and BCG vaccination program for the entire population. Records from all of these activities are currently organized in a master filing system which is the basic tool for both services and investigations. All available information bearing on tuberculosis—the results of chest X-rays, bacteriological examinations and skin tests and data on contacts, morbidity and mortality—is brought together both for the individual and the household.

In 1946, the year of the first mass X-ray survey, a special census showed that Muscogee County had a population of 95,638, of which about 30 percent were Negro. Approximately 57,000 persons lived in Columbus, the only city in the county, but the entire county can be considered essentially urban.

The survey, one of the first large community-wide surveys in this country, was a joint venereal disease-tuberculosis program in which each person over 12 years of age was offered a blood test and a 70-mm. chest X-ray. It was carried out during a period of 6 weeks in May and June 1946. The response of the community to the survey and the initial findings of the program have been described in an earlier paper (*5*). Roughly, of the population over 15 years of age, 50 percent of the whites, 90 percent of the Negroes or 60 percent of both races obtained an X-ray during the survey. The response was poorest in the group 20–34 years of age and in those over 60, and relatively poorer for the higher economic groups. All films were read independently by two physicians, one a certified radiologist with long experience in reading chest films, the other an experienced survey film reader. As a result of these two interpretations of the survey films, 461 white persons and 251 Negroes were judged by one or both readers to have sufficient evidence on their X-ray films to warrant systematic follow-up observations for tuberculosis. Of these numbers 5 percent of the whites and 6 percent of the Negroes could be identified as previously known cases of tuberculosis in the case register of the county health department.

From the beginning of the cooperative research program in 1946, careful attention has been directed to checking and verifying all deaths which are or might be due to tuberculosis. This has involved the routine matching of all death certificates of Muscogee County residents with the master tuberculosis index and an investigation of all deaths reported as tuberculosis for which full details are not available in the records of the health department.

As a result of this work it is possible to state, with considerable confidence in the accuracy and completeness of reporting, that 125 deaths from tuberculosis—45 whites and 80 Negroes—occurred among Muscogee County residents between July 1, 1946, and December 31, 1949. Four deaths officially reported as being due to tuberculosis are not included among the 125, while 6 deaths, not originally reported as tuberculosis, are included. In the total there is only one death, reported as miliary tuberculosis, for which there is some question as to the correctness of the cause of death. Since the number of deaths incorrectly certified as tuberculosis is almost balanced by those which should have been certified as tuberculosis it would appear that the officially reported death rate is reasonably accurate.

## Results

*Presurvey and postsurvey mortality rates*

Tuberculosis mortality in Muscogee County is compared for 3½-year periods, before and after the survey, to determine if the survey and the subsequent study program might have caused a significant decrease. Although a population of only 100,000 may be relatively small as a basis for calculating mortality rates, periods of 3½ years may be sufficiently long to give fairly reliable average annual rates. Such rates for Muscogee County for the periods immediately preceding and following the community-wide survey should be reasonably accurate. A census of the population was made immediately after the survey in 1946, and the interpolations between that census and the 1940 and 1950 official censuses give satisfactory population estimates. A good deal of reliance can be placed on the count of tuberculosis deaths in the period following the survey. Actually the only uncertain figure used for calculating the rates is the number of tuberculosis deaths in the presurvey period. But since the study of certification of tuberculosis deaths in the postsurvey period resulted in relatively few individual changes and almost no change in the total count, the officially reported figure for the earlier period is probably satisfactory. It is possible, however, that as a result of the survey and the study program, the emphasis on tuberculosis may have increased the reporting of tuberculosis as a cause of death and thus may have modified a decrease which might have occurred under circumstances of consistent reporting.

Table 1 indicates that tuberculosis mortality in Muscogee County dropped from 21 to 18 per 100,000 for whites and from 83 to 72 for Negroes, decreases of about 15 percent between the 2 periods. Comparable national averages for the same periods of time dropped from 33 to 25 for whites and from 105 to 81 for nonwhites, a decrease of about 23 percent for each racial group. It is of interest in this con-

Table 1. *Deaths and death rates from tuberculosis in Muscogee County by race, 3½-year periods preceding and following 1946 survey*

| Years | Population [1] | | | Deaths | | | Average annual death rate per 100,000 population | | |
|---|---|---|---|---|---|---|---|---|---|
| | Total | White | Negro | Total | White | Negro | Total | White | Negro |
| Jan 1, 1943, to June 30, 1946 | 90, 299 | 62, 305 | 27, 994 | 126 | 45 | 81 | 39 9 | 20 6 | 82. 7 |
| July 1, 1946, to Dec. 31, 1949 | 105, 111 | 73, 557 | 31, 554 | 125 | 45 | 80 | 34 0 | 17. 5 | 72. 4 |

[1] Estimates based on populations from United States censuses of 1940 and 1950, and a local census in 1946.

nection that tuberculosis mortality rates for the county are relatively low for both races compared with many other parts of the United States.

*Mortality among participants and nonparticipants of the survey*

One of the unanswered questions frequently raised regarding mass surveys is whether or not the prevalence of unknown tuberculosis is different among those who do and those who do not participate in the program. Information bearing on this question can be obtained from the present study by comparing subsequent mortality rates among the surveyed and nonsurveyed. In order for the comparison to be useful, however, it is necessary to take account of certain factors which rather obviously make the total surveyed group different from the nonsurveyed.

First, it is essential to remove from both groups the deaths of persons known at the start of the survey to be under treatment or active follow-up for tuberculosis. The reason for this is clear, since most persons actually ill with tuberculosis will not be among the surveyed, and the diagnostic services of the survey have little to offer cases already under active follow-up. These cases, referred to in this paper as "known cases" were listed in the working case register of the health department. As a matter of fact, most of them did not participate in the survey program.

Obviously, there could be many additions to this limited group of known cases. Persons might have been told that they had evidence of tuberculosis, and their physicians might have known these facts, without any record of this knowledge in the health department files. Such persons are "known" in the sense of having been diagnosed, but not "known" in the sense of having been reported to the official agency. The number of known cases could also be increased considerably by an exhaustive search of all old health department and hospital records. However, it would be practically impossible to identify all persons in these various categories of known cases, and for many of them, the dividing line between "known" and "unknown" becomes most indefinite. Because of these various considerations, it

appeared that the most practical correction would be to exclude from both the surveyed and nonsurveyed only those persons listed in the health department case register.

Second, survey X-ray films were offered only to persons over 12 years of age. In order to take account of this factor it becomes necessary, therefore, to base the mortality rate for the nonsurveyed group on the population and the deaths of nonsurveyed persons who were over 12 years of age in 1946.

The third factor which interferes with a useful comparison of the surveyed and nonsurveyed groups arises because the age, race, and sex distributions of the two populations differ very markedly (*5*). Since the number of deaths is relatively small, it is not practical to attempt a detailed correction for all of these variables. We have had to be content, therefore, with mortality rates for the surveyed and nonsurveyed groups, adjusted only to the race distribution of the total population.

A fourth and most troublesome source of uncertainty in the comparison of the two groups arises because deaths occurring among persons who have moved from the county since the 1946 census undoubtedly are unknown for all practical purposes. There is very little that can be done about this, and it has been necessary simply to assume that they occurred proportionately in both the surveyed and nonsurveyed populations.

The pertinent data from the present study for estimating the difference between the surveyed and nonsurveyed portions of the population are given in table 2. For the white race, over 12 years of age and not known to have had tuberculosis before the survey, the average annual tuberculosis mortality rate was 8 per 100,000 among Muscogee County residents who had a survey film. The comparable rate for those who did not have a survey film was 11. For the Negroes, parallel rates were 57 and 56. The adjusted rates for both races combined were 23 and 24, for the surveyed and nonsurveyed, respectively.

Table 2. *Deaths and death rates from tuberculosis in Muscogee County by race, July 1, 1946, through December 31, 1949, among persons surveyed and not surveyed in 1946*

| Survey status | Population [1] | | | Deaths [2] | | | Average annual death rate per 100,000 population | | |
|---|---|---|---|---|---|---|---|---|---|
| | Total | White | Negro | Total | White | Negro | Total [3] | White | Negro |
| Surveyed | 46,743 | 27,261 | 19,482 | 47 | 8 | 39 | 23.0 | 8.4 | 57.2 |
| Not surveyed | 36,001 | 29,336 | 6,665 | 24 | 11 | 13 | 24.2 | 10.7 | 55.7 |

[1] Surveyed population includes all who were X-rayed and gave Muscogee County addresses in the survey program in May or June of 1946. Not surveyed population is made up of all persons over 12 years of age who were enumerated in the September 1946 census but for whom there was no evidence that they had a survey film.
[2] Deaths from previously known cases of tuberculosis are excluded from both groups.
[3] Total rates adjusted to race distribution of total population in Muscogee County in 1946.



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It appears that the chance of dying from tuberculosis was not different among the surveyed and the nonsurveyed. More accurate rates might have been obtained for the group not surveyed if it had been possible to match all records for each individual completely and correctly. Undoubtedly, the nonsurveyed population includes some people who had survey films but whose X-ray records could not be matched to their census records. Likewise, death records for the nonsurveyed who were members of the community in 1946 did not all match with the census file. A correction for the latter would decrease the mortality among the nonsurveyed from that shown in table 2.

If one accepts the thesis that the surveyed and the nonsurveyed were not dissimilar in respect to tuberculosis mortality, this conclusion has an important implication with respect to a difference in the prevalence of tuberculous disease among the surveyed and nonsurveyed. Thus it may be argued that since the unknown cases of tuberculosis detected in the survey received medical care more promptly than otherwise would have happened, some of them at least, were prevented from dying from the disease. Comparable cases among the nonsurveyed, since they were not detected and given medical attention as promptly, may have had a higher fatality rate than their counterparts who participated in the survey. Since, in spite of this postulated difference in fatality rates in the two groups, the total mortality rate among surveyed and nonsurveyed was essentially the same, it may then be deduced that the prevalence of the disease was greater among the former than the latter.

Further speculation as to the interpretation of these findings could include the discussion of a wide range of important factors which may have influenced the mortality of the two groups. However, the number of deaths in this study is too limited to allow analyses of the effects of other variables.

*Proportional Distribution of Tuberculosis Deaths*

The most significant findings of the present study are obtained because it is possible to subdivide total tuberculosis mortality according to the four major groups of the population from which the deaths came. These were:

1. Previously known tuberculous patients. This group comprises the persons who were listed in the tuberculosis case register before the survey. It includes a few persons who had survey films.

2. Surveyed persons, further subdivided as: (a) "Positives," and (b) "negatives." The group as a whole excludes only previously known cases. "Positives" in this group were those who, on the basis of their 70-mm. survey films, 14″ x 17″ follow-up film and clinic examination were regarded as having either evidence of pulmonary

tuberculosis or sufficient suspicion of it, to warrant systematic observation for tuberculosis. "Negatives" were all others among the surveyed.

3. Nonsurveyed persons, further subdivided as: (a) Members of community during survey, and (b) newcomers to community. The group consists of adults not known to have the disease but who presumably could have had a survey film, plus those who could have participated had they been in the community at the time of the survey.

4. Ineligible persons. This is a relatively small group. It includes all persons who were less than 12 years old in 1946, and thereby ineligible for the survey, plus a group of Muscogee County residents who were inmates of the State Mental Hospital at Milledgeville, Ga.

Contributions from each of the above four groups to the total tuberculosis mortality cannot be determined as precisely as would be desirable. The principal reason for this is the practical difficulty of taking account of migration into and out of the county during the 3½-year observation period. For example, some Muscogee County residents undoubtedly moved away and died of the disease and in order to compensate for the loss of such deaths, it was finally considered necessary simply to include the deaths of new residents of the county as a separate subdivision of the group designated as nonsurveyed.

A fairly detailed allocation of the 125 tuberculosis deaths is given in table 3 according to the origin of the deaths from the above groups of the population. About one-fourth of the deaths occurred among cases known before the survey and about one-seventh among persons first discovered as tuberculous through the survey. These two proportions, while informative of the local situation, are dependent on the extent of previous case-finding procedures and the completeness

Table 3. *Observed distribution of deaths from tuberculosis in Muscogee County, by survey status and race, July 1, 1946, through Dec. 31, 1949*

| Survey status | Total | | White | | | | Negro | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Total | | | | Total | | | |
| | Number | Percent | Number | Percent | Male | Female | Number | Percent | Male | Female |
| Total | 125 | 100 | 45 | 100 | 20 | 25 | 80 | 100 | 43 | 37 |
| Known cases | *29* | *23* | *12* | *27* | *5* | *7* | *17* | *21* | *10* | *7* |
| Surveyed | *47* | *38* | *8* | *18* | *2* | *6* | *39* | *49* | *21* | *18* |
| Positive X-ray | 18 | 15 | 5 | 11 | 1 | 4 | 13 | 16 | 5 | 8 |
| Negative X-ray | 29 | 23 | 3 | 7 | 1 | 2 | 26 | 33 | 16 | 10 |
| Not surveyed | *34* | *27* | *15* | *33* | *9* | *6* | *19* | *24* | *10* | *9* |
| Members of community | 24 | 19 | 11 | 24 | 7 | 4 | 13 | 16 | 6 | 7 |
| New to community | 10 | 8 | 4 | 9 | 2 | 2 | 6 | 8 | 4 | 2 |
| Ineligible | *15* | *12* | *10* | *22* | *4* | *6* | *5* | *6* | *2* | *3* |
| Under 12 years of age | 8 | 6 | 5 | 11 | 1 | 4 | 3 | 4 | 1 | 2 |
| Hospitalized in mental institutions | 7 | 6 | 5 | 11 | 3 | 2 | 2 | 2 | 1 | 1 |

of the survey. They must not be viewed as being representative of surveys in general. For example, if case finding in a community is very extensive before a survey, proportionately fewer cases would be available for discovery by the community-wide program, and it would be expected that the contribution of known cases to subsequent mortality would be larger. If, on the other hand, only a small proportion of the cases in a community are known before the survey, deaths among survey-discovered cases might be expected to be a larger proportion of all tuberculosis deaths. Another important factor which would influence the proportion of deaths among survey-discovered cases is, of course, the completeness of the survey.

Deaths among persons classified as nonsurveyed, either because they did not choose to have a survey film or were newcomers to the community, totaled one-quarter of all tuberculosis deaths. Again, this proportion is applicable to the Muscogee County program and might differ markedly in other communities.

About one-eighth of the deaths came from segments of the population which are more or less outside the scope of survey activities. Thus, 6 percent of the tuberculosis deaths were in the unsurveyed child population and an additional 6 percent in the special small group institutionalized for mental illness. To some extent it may be reasonable to view this proportion of tuberculosis mortality as an estimate of what might be found generally in other community groups.

The last, and perhaps the most significant finding presented in table 3, is that 29 or one-fourth of all tuberculosis deaths occurred among persons who actually had a survey X-ray film but were advised that they were free of the disease. A very marked difference between whites and Negroes is apparent: less than one-tenth of the white deaths, but one-third of the Negro deaths occurred in the population actually surveyed and reported as having negative films. Part of this apparent difference is obviously created by the fact that a much higher proportion of the Negro than the white population had survey films.

The question may be raised as to whether inaccuracies in the interpretation of the 70-mm. survey films might account for the finding of such a large number of deaths so soon after the survey, among those reported as having negative films. This question was investigated by a careful review of the 70-mm survey films of the 29 cases. For 25 films, retrospective study, even with the knowledge of the location of the lesions which appeared on later films, failed to reveal any evidence of abnormality. In 4 of the 29 survey films, however, lesions suggestive of tuberculosis were observed, 2 of which were quite definite. It must be admitted that these 4 films represent positive cases which were missed by two experienced film readers.

The significance of reporting these 4 films as negative should be judged in terms of the number of fatal cases found among those with

positive films. As shown in table 3, 18 of that group died of tuberculosis and, together with the 4 missed cases, make a total of 22 deaths among actually positive survey cases. Obviously, this is not a large experience from which to draw general conclusions, but in this instance at least, about 20 percent of disease serious enough to be fatal in a relatively short time was missed on two independent readings of the survey films.

*Contributions to mortality of potential survey positives and negatives*

As indicated in previous sections of the paper, contributions to tuberculosis mortality of the various component parts of the observed surveyed and nonsurveyed groups are highly interrelated and furnish findings which primarily apply only to the particular situation and survey in Muscogee County. By making certain assumptions, however, it is possible to rearrange and summarize these findings in such a way as to furnish a very much more generalized evaluation of the effects of the community-wide survey technique. The essence of this generalization is to estimate the potential amount of tuberculosis mortality that might have been included in survey positive cases and survey negative cases had the entire adult population of the community been surveyed. To express it somewhat differently, an attempt is made to estimate the amount of fatal tuberculosis in the following 3½ years, that would, and would not, have been identified by a complete community-wide survey. From the data already presented it would appear that there might be a very significant difference between whites and Negroes in this respect, pointing to a marked difference for the two races in the efficiency of the community-wide survey in detecting rapidly fatal tuberculosis.

Table 4 presents a hypothetical distribution of tuberculosis mortality into three component parts according to the population from which it arises—persons regarded as ineligible for the survey, "potential positives" and "potential negatives." The "potential positives" include cases known before the survey, positives observed among the surveyed, and an estimate of the positives among the nonsurveyed.

Table 4. *Theoretical distributions of deaths from tuberculosis in Muscogee County, by survey status and race, July 1, 1946, through Dec. 31, 1949, assuming 100 percent participation of the eligible population*

| Survey status | Total | | White | | Negro | |
|---|---|---|---|---|---|---|
| | Number | Percent | Number | Percent | Number | Percent |
| Total | 125 | 100 | 45 | 100 | 80 | 100 |
| Ineligible for X-ray | *15* | *12* | *10* | *22* | *5* | *6* |
| Eligible for X-ray | *110* | *88* | *35* | *78* | *75* | *94* |
| Potential positives | 64 | 51 | 27 | 60 | 37 | 46 |
| Potential negatives | 46 | 37 | 8 | 18 | 38 | 48 |

"Potential negatives" then become those found to be negative when surveyed plus the estimated number of negatives among the nonsurveyed. The critical problem in obtaining these numbers is, of course, the subdivision of deaths among the nonsurveyed into those who would be expected to have positive and negative films had they been surveyed. We have done this by assuming that deaths among the nonsurveyed would have been divided between "positives" and "negatives" in the same proportion as was observed in the surveyed group. This assumption is strengthened by the fact that mortality was essentially the same among the surveyed and the nonsurveyed. Actually, 62 percent of the deaths among the surveyed whites and 33 percent of those among the surveyed Negroes had positive films in the survey, and these were the proportions applied to the nonsurveyed population to estimate the "positives."

The resulting theoretical distribution brings out the potentialities of locating subsequently fatal tuberculosis by a complete X-ray survey of a community. Approximately 12 percent of the deaths, as previously shown, occurred in that part of the population which was ineligible for the mass program. Just over half of the deaths would be expected among persons defined as having positive survey films while 37 percent would have been judged to be free of the disease.

Table 4 also shows a marked difference between whites and Negroes in the proportion of deaths occurring among potentially negative cases. Assuming complete examination of both races, about one-fifth of all white tuberculosis deaths can be expected to come from the group of persons with negative chest X-rays. Among Negroes, however, one-half of all of those who died of tuberculosis would have had negative survey films.

### *Special Tuberculosis Death Rates*

In the previous sections of this paper, tuberculosis mortality has been presented in terms of the proportion of deaths that arise from different subgroups of the population. This method of analysis was adopted, rather than the more usual one of determining group-specific mortality rates, because of the difficulty of obtaining population counts for the different subgroups. Reasonably satisfactory population figures are available, however, for the groups designated as survey positives and negatives. Table 5 provides the data for a comparison of whites and Negroes. The deaths recorded there exclude cases known before the survey. Populations for the survey negatives are simply the counts of persons whose films were interpreted as negative. Populations for the survey positives include those persons considered to be in need of observation for definite or suspected tuberculosis, based on the findings of the initial clinic examination. No cases have been discharged from follow-up except for definite evi-

dence on subsequent examinations that the initially observed abnormality was not tuberculous. Such persons as have been discharged during the 3½-year post survey period have also been excluded from the survey positive population as given in table 5.

Table 5. *Deaths and death rates from tuberculosis in Muscogee County by race, July 1, 1946, through Dec. 31, 1949, in selected groups of the surveyed population*

| Survey status and race | Population | Deaths | Average annual death rate per 100,000 population |
|---|---|---|---|
| Survey positive: | | | |
| White | 377 | 5 | 380 |
| Negro | 189 | 13 | 1,970 |
| Survey negative: | | | |
| White | 26,860 | 3 | 3 |
| Negro | 19,277 | 26 | 39 |

As might be expected, the death rates for survey positive cases are very high—almost 400 per 100,000 for whites and nearly 2,000 for Negroes. In one sense, these are crude tuberculosis fatality rates and, although based on very small numbers of deaths, give some indication of the effectiveness of the services rendered survey-discovered cases. While it is not possible to determine how much larger the rates might have been without the survey, it is obvious that not all cases can be prevented from dying.

The mortality rate among survey negative cases is very low for whites—3 per 100,000 persons per year. This finding certainly indicates that rapidly fatal tuberculosis very rarely occurs among those who have a survey film that is reported as being negative. In striking contrast, the Negro rate is 39, 13 times that for the whites. For both the presurvey and the postsurvey periods, the total Negro death rate from tuberculosis is only 4 times that for the whites; for the populations not surveyed, and for the survey positives, the Negro death rate is only 5 times greater. Because of the small number of deaths occurring in some of these groups, it is not possible to demonstrate statistically significant differences. It would appear, however, that it is in the negative group that Negro tuberculosis mortality compares least favorably with the white.

The fatal cases among the persons with negative films must have resulted from tuberculous disease arising either from within an individual as endogenous disease, from outside sources, resulting in exogenuous reinfection or progressive primary disease. One would not expect the Negroes with negative films to have been exposed to any more infectious cases than the whites, since the survey program of identification and isolation appeared to have been more effective for the Negroes. Three-quarters of the adult Negroes but only half of the whites were surveyed. It may be assumed then that,

of the contagious cases, more Negroes than whites were identified. The achievement of complete isolation of all infectious cases is a practical problem in most large communities because of the reluctance of patients to accept medical recommendations and treatment. For about two-thirds of the cases in this county, hospitalization was provided, a record that probably compares favorably with most other large communities. This proportion of known infectious cases hospitalized and consequently fairly well isolated has been maintained throughout the postsurvey period. Estimates would indicate that a higher proportion of Negro than white contagious cases was isolated. Although the white cases left in the community could expose some Negroes, and vice versa, yet for practical purposes the contagious cases are most likely to expose members of their own race. Consequently, it is difficult to see how there could be more unisolated sources to infect Negroes than the whites.

There are other possible explanations for this situation. It may be that the contacts of the unisolated Negro cases had more intense infection, and because of this greater dosage of infection, they were more prone to develop fatal disease. It is also possible that the Negro contacts who did develop the disease ran a much more rapid clinical course, and that insufficient time has elapsed for more chronic cases to appear in the mortality statistics. General clinical experience indicates that whites are more likely to have slowly progressive tuberculosis than Negroes, and because of this it may be that 3½ years is insufficient time to demonstrate fatal disease among the whites. Or, finally, it may well be that endogenous tuberculosis is of greater significance among Negroes than whites. Further studies, more extensive in both numbers and time, will be required to elucidate why the Negroes with previously negative films appear to compare less favorably with their white counterparts than do those with X-ray evidence of tuberculosis.

If future experience should demonstrate that the marked race difference in mortality among persons with negative survey films is not due to the relatively short period of observation, these findings will have enormously important implications for tuberculosis control, as Davies (*6*) and his coworkers (*7*) have pointed out. For whites, a single complete survey of the entire population might possibly reduce tuberculosis control for a considerable period of time almost entirely to the task of providing adequate medical care and follow-up service for cases that can be identified by the mass survey procedure. For Negroes, such a program as carried out at the present time would apparently not be sufficient. But whether improvements could be effected through much more prompt and effective isolation for Negroes, through more extensive and frequent postsurvey case finding, or through measures designed to decrease the likelihood of endogenous

disease, cannot be answered at this time. However, by means of such intensive studies as are being continued in Muscogee County of the conditions under which persons with negative survey films acquire rapidly fatal disease, it may be possible to discover the critical elements that are still lacking in our understanding of the natural history of tuberculosis, and through this knowledge to suggest more effective methods of its control.

## Summary

In 1946, a community-wide chest X-ray survey was carried out in Muscogee County, Ga., in which 60 percent of the population over 12 years of age was examined. On the basis of a census taken shortly after the survey and a careful study of tuberculosis in the county since the survey, it has been possible to allocate tuberculosis deaths which occurred in a 3½-year postsurvey period into three major groups—those among cases known prior to the survey, those examined in the survey, and those not examined in the survey. Although the number of tuberculosis deaths in this period is too small to allow extensive analyses, or conclusions which are as definitive as might be desirable, the results would appear to warrant careful consideration. Among these results are the following:

1. Tuberculosis mortality rates for the county decreased slightly in the 3½-year period following the survey.

2. Tuberculosis mortality among the surveyed and nonsurveyed populations is not significantly different. Since part of the surveyed cases had treatment earlier in their disease than the nonsurveyed cases, their fatality may have been somewhat decreased. This suggests that the nonsurveyed population had proportionately fewer cases of tuberculosis than the surveyed; and the fact that the death rate was not more markedly decreased cannot be explained on the basis of undiscovered cases alone.

3. If one assumes that all eligible persons in the community were X-rayed in the survey, it can be estimated that three-eighths of all deaths would have occurred among persons with negative survey films. One-fifth of all white deaths and one-half of Negro deaths would not have shown X-ray evidence of tuberculosis at the time of the survey.

4. Crude fatality rates for the survey positive cases are rather high, averaging annually to almost 400 per 100,000 for the whites, and slightly less than 2,000 for the Negroes.

5. Mortality rates among survey negatives show even more striking race differences. The white rate is only 3 per 100,000; the Negro rate is 39, or 13 times as large. However, Negro mortality among those with evidence of disease on the survey film and among the general

population is only 4 to 5 times as great as the white. The reasons for the greater difference between races in mortality among those with no evidence of tuberculosis at the time of the survey are unknown. Since a larger proportion of the Negroes were X-rayed in the survey and thereby more cases were identified and isolated it seems unlikely that more contagious cases were left as sources of infection among the Negroes than the whites.

If future studies confirm these findings, it appears that a complete survey in a white population followed by adequate isolation might be so effective that for some time the tuberculosis control program in the community would consist chiefly of the provision of medical care and follow-up services to persons identified as tuberculous in the survey. For Negroes, it would seem that this would not be sufficient. Studies are being continued to ascertain the reasons for the striking difference in mortality between the two races, to improve our understanding of this disease, and to increase thereby the effectiveness of tuberculosis control.


## ACKNOWLEDGMENT

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# APPENDIX

**Table A.** *Deaths from tuberculosis in Muscogee County, by age, race, and sex, July 1, 1946, through Dec. 31, 1949*

| Age at death | Total | White | | | Negro | | |
|---|---|---|---|---|---|---|---|
| | | Total | Male | Female | Total | Male | Female |
| Total | 125 | 45 | 20 | 25 | 80 | 43 | 37 |
| Under 15 years | 8 | 5 | 1 | 4 | 3 | 1 | 2 |
| 15–24 | 12 | 3 | -------- | 3 | 9 | 5 | 4 |
| 25–34 | 33 | 6 | 2 | 4 | 27 | 11 | 16 |
| 35–44 | 31 | 9 | 7 | 2 | 22 | 15 | 7 |
| 45–64 | 35 | 18 | 8 | 10 | 17 | 9 | 8 |
| 65 and over | 6 | 4 | 2 | 2 | 2 | 2 | -------- |

**Table B.** *Deaths from tuberculosis in Muscogee County, July 1, 1946, through Dec. 31, 1949, among persons with negative survey films in 1946 by age, race, and sex*

| Age at death | Total | White | | | Negro | | |
|---|---|---|---|---|---|---|---|
| | | Total | Male | Female | Total | Male | Female |
| Total | 29 | 3 | 1 | 2 | 26 | 16 | 10 |
| 15–24 | 5 | 2 | -------- | 2 | 3 | -------- | 3 |
| 25–34 | 8 | -------- | -------- | -------- | 8 | 4 | 4 |
| 35–44 | 13 | 1 | 1 | -------- | 12 | 9 | 3 |
| 45–64 | 2 | -------- | -------- | -------- | 2 | 2 | -------- |
| 65 and over | 1 | -------- | -------- | -------- | 1 | 1 | -------- |

**Table C.** *Deaths from tuberculosis in Muscogee County, July 1, 1946, through Dec. 31, 1949, among persons with negative survey films in 1946, by year when disease was first diagnosed, and race*

| Year of diagnosis | Race | | |
|---|---|---|---|
| | Total | White | Negro |
| Total | 29 | 3 | 26 |
| 1946 | 3 | -------- | 3 |
| 1947 | 8 | 2 | 6 |
| 1948 | 10 | 1 | 9 |
| 1949 | 8 | -------- | 8 |

**Table D.** *Deaths from tuberculosis in Muscogee County, July 1, 1946, through Dec. 31, 1949, by year of death, survey status in 1946, and race*

| Year of death | Total | | | Survey negatives | | | Survey positives | | | Known before survey | | | Remainder not X-rayed | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Total | White | Negro | Total | White | Negro | Total | White | Negro | Total | White | Negro | Total | White | Negro |
| Total | 125 | 45 | 80 | 29 | 3 | 26 | 18 | 5 | 13 | 29 | 12 | 17 | 49 | 25 | 24 |
| 1946 | 11 | 4 | 7 | ---- | ---- | ---- | ---- | ---- | ---- | 6 | 3 | 3 | 5 | 1 | 4 |
| 1947 | 35 | 10 | 25 | 7 | 1 | 6 | 10 | 2 | 8 | 10 | 1 | 9 | 8 | 6 | 2 |
| 1948 | 36 | 17 | 19 | 9 | 1 | 8 | 3 | 1 | 2 | 8 | 5 | 3 | 16 | 10 | 6 |
| 1949 | 43 | 14 | 29 | 13 | 1 | 12 | 5 | 2 | 3 | 5 | 3 | 2 | 20 | 8 | 12 |

# Secondary Radiation Limits in Photofluorography

By WILLARD W. VAN ALLEN, B. Sc.*

In establishing standards for the protection of personnel subjected to general X-radiation, the National Advisory Committee on X-ray and Radium Protection, National Bureau of Standards, in 1949 recommended a maximum tolerance dosage of 0.3 roentgen (300 milliroentgens) per week (*1*). Although this standard is generally observed at the present time, there are many who feel that the recommended radiation dosage limit is too high, especially under operating conditions where particularly susceptible parts of a technician's body may be exposed to X-rays. Several generations must elapse before this limit, or any other for that matter, can be proved entirely safe. Therefore, in the absence of definite proof of safety, it must be the aim of all concerned with radiation protection not merely to keep the personnel dosage rate below the arbitrary level of 300 mr. per week, but rather, to keep it as low as possible.

It should follow, therefore, that there can be no justification for operating an X-ray unit at higher personnel radiation dosage levels than those encountered on other similar installations, even though all dosages are within the 300 mr. per week limit. In other words, the criterion for radiation safety should be represented by the radiation dosage conditions encountered in the installation affording the most nearly complete protection. Thus, if a photofluorographic unit can operate at a personnel exposure level of 40 mr. per 1,000 exposures, any other unit which may be operating at twice this dosage level can justifiably be criticized for its inadequate protection of personnel, even with a total weekly dosage under existing load conditions of less than 300 mr.

What, therefore, are realistic limits for radiation exposure dosage in the operation of photofluorographic machines? In an attempt to answer this question, the Electronics Laboratory of the Division of Chronic Disease and Tuberculosis, measured the radiation levels encountered in a wide variety of photofluorographic equipment used by the Division in mass chest X-ray surveys, and prepared radiation field maps on the basis of this information (*2*). These maps indicated the amount of radiation exposure sustained by personnel working in each type of X-ray installation. Two of these field maps are pre-

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sented in figures 1 and 2. The former shows the radiation intensity in the various regions surrounding a typical portable photofluorograph, while the latter gives the same information for a typical mobile installation. These two examples have been chosen not because they necessarily represent ideal protective conditions, but rather the best conditions found in the study. At the same time, they are the most commonly used installation plans.

In each of these typical installations, a technician should be able to limit his radiation dosage to approximately 40 mr. per 1,000 exposures. Clerks in the mobile installation (fig. 2) should receive no more than 30 mr. per 1,000 exposures, while those in the portable unit (fig. 1), should receive even less than this dosage if reasonable care is taken to locate them at positions affording maximum protection.

In the experience of the Division of Chronic Disease and Tuberculosis, these radiation exposure dosage limits of 40 mr. per 1,000

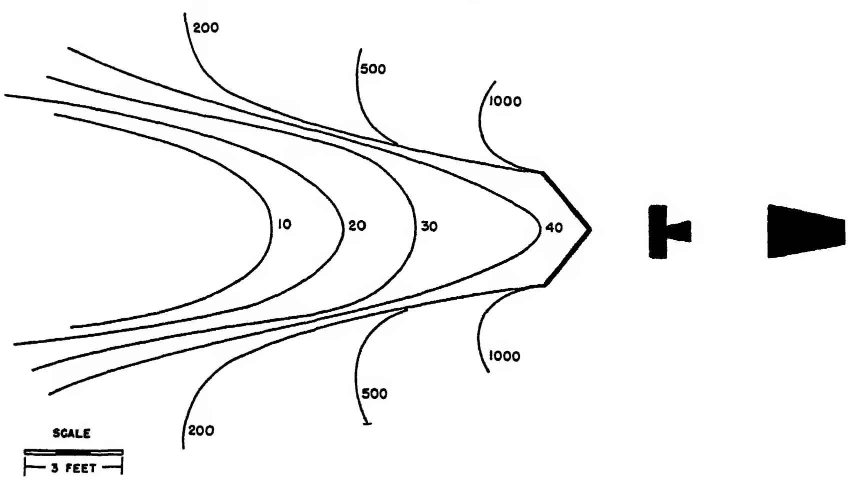


**Figure 1. Radiation intensities (in milliroentgens per 1,000 exposures) surrounding a typical portable photofluorograph.**

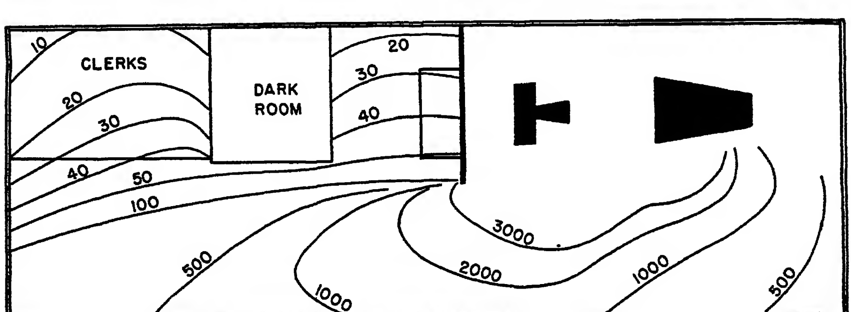


**Figure 2. Radiation intensities (in milliroentgens per 1,000 exposures) surrounding a typical mobile photofluorograph.**

exposures for technicians and operators and 30 mr. per 1,000 for clerks are not only practicable, but entirely tenable under actual operating conditions. Radiation monitoring by means of dental film badges in the recent Los Angeles County chest X-ray survey showed this to be true by revealing weekly average dosage levels of 47 mr. per 1,000 exposures for technicians, and 30 mr. per 1,000 for clerks. Both of these actual figures were in excellent agreement with predicted values, and both resulted in total weekly dosages under existing load conditions of well below 300 mr. Installations which operate at higher radiation dosages than these should therefore give cause for concern, since they expose personnel to more radiation than necessary.

Radiation monitoring programs, utilizing either ionization chambers or dental film badges and taking into consideration weekly unit exposure loads, are most useful in determining not only how well operating personnel are observing safety rules, but also how effective the protective devices themselves are. It should be reemphasized, however, that monitoring should serve not only as a check against dosages exceeding 300 mr. per week, but, more important, against dosages in excess of 40 mr. per 1,000 exposures for technicians, and 30 mr. per 1,000 for clerks. By tabulating the results of such monitoring programs, a clear picture of the entire radiation exposure situation may be had at a glance.

In the Los Angeles County chest X-ray survey, in which U. S. Public Health Service personnel participated, monitoring tables were kept for 150 employees assigned to 40 photofluorographic units over the course of 26 weeks of operation. Selected portions of these tables are presented in tables 1 and 2. Table 1 shows part of the monitoring record for individual technicians according to the units to which they were assigned. The figures shown in this table represent the factors by which monitored radiation, as recorded on the dental film badges, exceed 40 mr. per 1,000 exposures; only those factors which are greater than 1.5 are recorded. As indicated in the table, technician B received more than "normal" amounts of radiation on several different units. Other technicians working on these same units, however, did not receive overdoses. Obviously, this is compelling presumptive evidence of technician B's carelessness.

On unit 5, on the other hand, it will be noted that several technicians received radiation dosages ranging from three to five times the "normal" amount, some of them repeatedly. This is equally convincing evidence of the inadequacy of protective measures employed on this particular unit. At the very least, it is evident that personnel protection on this unit was inferior to that of other units, so that investigation was distinctly warranted.

Table 2 presents overdose factors recorded for individuals assigned to a given unit each week. Here again, only dosages which exceed the

Table 1. *Extent of radiation in excess of 40 mr. per 1,000 exposures received by technicians at various operating units*

| Technician | Excess factor [1] | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Unit 1 | Unit 2 | Unit 3 | Unit 4 | Unit 5 | Unit 6 | Unit 7 | Unit 8 |
| A | | | | | 3.0<br>4.9 | | | |
| B | 3.0 | | 5.2 | 2.0 | | | 2.5 | |
| C | | | | | 4.5 | | | |
| D | | | | | 3.2<br>3.7<br>4.8 | | | |
| E | | | | | | | | |
| F | | | | | 3.9 | | | |

[1] Factor by which radiation exceeds 40 mr. per 1,000 exposures; only factors greater than 1.5 are shown.

Table 2. *Extent of radiation in excess of 40 mr. per 1,000 exposures*

| Week | Excess factor [1] | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Unit 1 | Unit 2 | Unit 3 | Unit 4 | Unit 5 | Unit 6 | Unit 7 | Unit 8 |
| 1 | | | | | 5.9<br>7.2 | | | |
| 2 | 1.5 | | | | 6.3<br>2.1 | | | |
| 3 | | | | | 7.4 | | | |
| 4 | | | | | | | 2.1 | |
| 5 | | | | | 5.5 | | | |
| 6 | | | | | | | | 2.2 |
| 7 | | 3.1<br>7.4<br>6.7 | | | 4.7<br>13.3 | | | |
| 8 | | 4.6 | | 2.0 | | | | |
| 9 | | 12.0<br>4.0<br>6.5 | | | | | | 2.0 |
| 10 | | | | | 11.2 | | | |
| 11 | | 5.0<br>4.2 | | | 5.2 | | | |
| 12 | | 3.9 | | | 6.5 | | | |

[1] Factor by which radiation exceeds 40 mr. per 1,000 exposures; only factors greater than 1.5 are shown.

"normal" by a factor of more than 1.5 are shown. As indicated, units 1, 3, 4, 6, and 7 appear to be adequately protected, while unit 5 shows a consistent record of overdosages, as it does in table 1. In the case of unit 2, it is evident that something happened after the sixth week of operation to reduce the effectiveness of protective measures. Investigation following these tabulations revealed the causes for these "failures," so that recommendations for improvement of protective techniques could be made.

Since it is possible to establish exposure "norms" for all types of operating personnel and all types of installations, it should be obvious that the calculation of individual radiation dosages on a "per 1,000" basis is far more valuable than the mere determination of whether the weekly dose is less than 300 mr. or not. All results calculated on this basis, however, must be interpreted with due regard for the possibility of occasional accidents. Dental film badges may be forgotten by the technicians, so that low radiation readings may result. Furthermore,

the badges may inadvertently be left in areas subject to radiation, so that it is possible to encounter excessive readings even in cases where a technician has been off duty for a day or two.

## Summary


1. Radiation protection programs should be based on limiting exposure to the lowest practical level within the maximum tolerance dosage of 300 mr. per week.

2. Studies show that radiation exposure of personnel employed in most types of photofluorographic installations can readily and practicably be limited to 40 mr. per 1,000 exposures for technicians and 30 mr. per 1,000 for clerks. At the higher figure, 7,500 exposures per week could be made within the limits of the maximum tolerance dose of 300 mr.; this load is very rarely approached in practice.

3. Personnel monitoring, through the use of ionization chambers or dental film badges, should be conducted not only to assure personnel radiation dosages of less than 300 mr. per week, but also to maintain *maximum* protection below this level.

4. Radiation monitoring reports should be interpreted against maximum dosages of 40 mr. per 1,000 exposures for technicians and 30 mr. per 1,000 for clerks. Dosages in excess of these levels should be investigated and steps taken to correct the causes of excessive exposure, even though total radiation is less than 300 mr. per week.

5. Tabular records of radiation exposure levels should be kept for individual employees and individual units as a means of indicating failures in the protective program. These records should indicate the extent to which the levels recommended in the preceding paragraph are exceeded.

6. Protective devices and techniques which do not afford *maximum* protection should be discarded even though their use assures radiation dosages below the tolerance level of 300 mr. per week.


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# Incidence of Disease

*No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring*

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## UNITED STATES

### Reports From States for Week Ended May 12, 1951

Three cases of anthrax were reported for the current week, two in Pennsylvania and one in California. A case of psittacosis was reported in Maywood, Cook County, Ill.

The incidence of poliomyelitis has remained stationary for several weeks. A total of 71 cases was reported for the current week as compared with 58, 71, 52, 73, and 70 for the previous 5 weeks. A total of 101 cases was reported for the week ended May 13, 1950.

#### Epidemiological Reports

*Erythema Infectiosum*

Dr. J. W. R. Norton, North Carolina Health Officer, has reported an epidemic of a disease tentatively diagnosed as erythema infectiosum (Fifth Disease) among children in several schools located in Buncombe County near Asheville. It is estimated that 100 to 200 children have been affected with a very mild disorder in which there was a transient erythema and macular rash lasting 2 to 7 days. A few cases had a low grade fever and gastro-intestinal symptoms. No specific control measures were instituted since school attendance was not seriously affected.

*Infectious Hepatitis*

Dr. J. W. R. Norton has reported an outbreak of infectious hepatitis among children in Columbus County which is located in the southeastern part of North Carolina. The attack rate was sufficiently high in one or two instances to require the temporary closing of certain grades in a school, but the infection did not appear to involve a very wide area of the county.

*Epidemic Jaundice*

Dr. J. R. McDowell, Colorado Department of Public Health, has reported an extensive epidemic of epidemic jaundice in Montrose, Colo. Cases have been occurring in the community since October

1950. The illness has been characterized by fever (102° to 104°), abdominal pain, and jaundice. Some of the clinical as well as epidemiological findings suggest the possibility of leptospirosis. One group of multiple cases in a family was reported to have followed the death of a dog that had jaundice.

*Tularemia*

Dr. R. M. Albrecht, New York State Department of Health, has reported three cases of tularemia in Cayuga County. In the investigation conducted by Dr. Walter Levy, it was found that two cases were in a man and his wife who were engaged in skinning muskrats. Both had the ulceroglandular type of infection. The third case was in a muskrat trapper in an adjoining area. Three previous cases in persons trapping and skinning muskrats were reported from nearby Wayne County in 1942 and two in Oswego County in 1930.

*Anthrax*

Dr. W. L. Halverson, California Director of Public Health, has reported a fatal case of anthrax in an 11-year-old boy who left Missouri April 25 by automobile with his parents to visit in California. The first night of the trip was spent in Oklahoma at which time the boy was scratched or bitten on the hip by an insect. It was not brought

***Comparative Data For Cases of Specified Reportable Diseases: United States***

[Numbers after diseases are International List numbers, 1948 revision]

| Disease | Total for week ended— | | 5 year median 1946–50 | Seasonal low week | Cumulative total since seasonal low week | | 5-year median 1945–46 through 1949–50 | Cumulative total for calendar year— | | 5-year median 1946–50 |
|---|---|---|---|---|---|---|---|---|---|---|
| | May 12, 1951 | May 13, 1950 | | | 1950–51 | 1949–50 | | 1951 | 1950 | |
| Anthrax (062) | 3 | 1 | 1 | (1) | (1) | (1) | (1) | 31 | 12 | 18 |
| Diphtheria (055) | 82 | 75 | 141 | 27th | 4504 | 6894 | 9,961 | 1,597 | 2,623 | 3,603 |
| Encephalitis, acute infectious (082) | 15 | 12 | 12 | (1) | (1) | (1) | (1) | 290 | 248 | 168 |
| Influenza (480–483) | 1,027 | 1,404 | 768 | 30th | 125,958 | 144,408 | 144,408 | 111,416 | 133,824 | 125,049 |
| Measles (085) | 24,190 | 15,507 | 26,551 | 35th | 346,952 | 195,453 | 398,781 | 318,251 | 176,323 | 363,835 |
| Meningitis, meningococcal (057.0) | 77 | 80 | 75 | 37th | 2,937 | 2,695 | 2,643 | 1,976 | 1,781 | 1,671 |
| Pneumonia (490–493) | 1,147 | 1,593 | (2) | (1) | (1) | (1) | (1) | [3] 36,033 | 46,842 | (2) |
| Poliomyelitis, acute (080) | 71 | 101 | 84 | 11th | 482 | 551 | 435 | 1,694 | 1,682 | 842 |
| Rocky Mountain spotted fever (104) | 6 | 7 | 8 | (1) | (1) | (1) | (1) | 19 | 31 | 31 |
| Scarlet fever (050)[4] | 1,772 | 1,395 | 1,957 | 32d | 57,976 | 48,529 | 71,544 | 42,285 | 32,090 | 48,904 |
| Smallpox (084) | ------ | 1 | 2 | 35th | 13 | 42 | 65 | 5 | 21 | 44 |
| Tularemia (059) | 14 | 24 | 16 | (1) | (1) | (1) | (1) | 264 | 387 | 387 |
| Typhoid and paratyphoid fever (040, 041)[5] | 39 | 108 | 69 | 11th | [6] 321 | 398 | 404 | [6] 756 | 908 | 908 |
| Whooping cough (056) | 1,662 | 2,867 | 1,965 | 39th | [7] 50,772 | 71,513 | 71,513 | [7] 29,170 | 49,977 | 40,341 |

1 Not computed.
2 Data not available.
3 Additions—week ended May 5: Florida, 17 cases and West Virginia, 29.
4 Including cases reported as streptococcal sore throat.
5 Including cases reported as salmonellosis.
6 Deductions: Arkansas, weeks ended Mar. 3 and 31, 1 and 2 cases, respectively.
7 Deduction: Pennsylvania, week ended Apr. 28, 828 cases.

to the attention of the parents until 4 days later when they arrived in California. A large ulcerated area on the thigh and meningitis were noted when he was hospitalized on May 2. He died May 3. Anthrax bacilli were cultured from spinal fluid and confirmed by animal inoculation.

*Rabies in Animals*

Dr. A. L. Gray, Mississippi Board of Health, has reported an outbreak of rabies in wild foxes, cattle, and dogs in the northern part of Smith County and the southern part of Scott County, which are adjoining areas. The outbreak apparently started in wild foxes of which 12 have died or have been killed and were suspected of having rabies. One fox head was confirmed by laboratory examination. Eighteen cattle and two dogs have died of rabies. Another small outbreak has occurred in the city of Natchez in Adams County, consisting of four rabid dogs.

Dr. E. A. Belden, Missouri Division of Health, has reported that the rapid rise in the number of cases of rabies in animals in recent weeks has been due to the existence of a rabies epidemic in the city and county of St. Louis, and also to accumulated reports which had not previously been made.

In Iowa, Minnesota, Nebraska, North Dakota, and South Dakota, rabies in skunks, or civet cats, is a current problem.

## Reported Cases of Selected Communicable Diseases: United States, Week Ended May 12, 1951

[Numbers under diseases are International List numbers, 1948 revision]

| Area | Diphtheria (055) | Encephalitis, infectious (082) | Influenza (480–483) | Measles (085) | Meningitis, meningococcal (057.0) | Pneumonia (490–493) | Poliomyelitis (080) |
|---|---|---|---|---|---|---|---|
| **United States** | 82 | 15 | 1,027 | 24,190 | 77 | 1,147 | 71 |
| **New England** | 2 | | 9 | 836 | 5 | 29 | |
| Maine | 1 | | 8 | 47 | | 7 | |
| New Hampshire | | | | 9 | | 2 | |
| Vermont | | | | 76 | | | |
| Massachusetts | 1 | | | 459 | 5 | | |
| Rhode Island | | | | 5 | | 1 | |
| Connecticut | | | 1 | 240 | | 19 | |
| **Middle Atlantic** | 6 | 4 | 11 | 4,061 | 6 | 169 | 9 |
| New York | 1 | | [1] 5 | 1,733 | 3 | 42 | 8 |
| New Jersey | 1 | 4 | 6 | 704 | 1 | 55 | 1 |
| Pennsylvania | 4 | | | 1,624 | 2 | 72 | |
| **East North Central** | 12 | 6 | 27 | 4,089 | 18 | 119 | 8 |
| Ohio | | | | 685 | 6 | | |
| Indiana | 4 | 1 | 20 | 255 | | 11 | |
| Illinois | 7 | 2 | 5 | 630 | 7 | 62 | 3 |
| Michigan | 1 | 3 | 2 | 655 | 1 | 46 | 2 |
| Wisconsin | | | | 1,864 | 4 | | 3 |
| **West North Central** | 2 | | 42 | 1,400 | 8 | 96 | 2 |
| Minnesota | | | 2 | 104 | 2 | 15 | |
| Iowa | 1 | | | 290 | 3 | | 1 |
| Missouri | | | 1 | 221 | 3 | 1 | |
| North Dakota | | | 39 | 64 | | 76 | |
| South Dakota | | | | 28 | | 1 | 1 |
| Nebraska | | | | 41 | | | |
| Kansas | 1 | | | 652 | | 3 | |
| **South Atlantic** | 24 | | 397 | 1,856 | 14 | 139 | 10 |
| Delaware | | | | 17 | | | |
| Maryland | | | 3 | 221 | | 53 | |
| District of Columbia | | | 3 | 63 | | 24 | |
| Virginia | 5 | | 317 | 756 | 8 | 42 | 1 |
| West Virginia | 4 | | | 168 | 1 | | 1 |
| North Carolina | 9 | | | 172 | | | 1 |
| South Carolina | 4 | | 42 | 47 | 1 | 14 | |
| Georgia | | | 32 | 226 | 4 | 6 | 2 |
| Florida | 2 | | | 186 | | | 5 |
| **East South Central** | 5 | 4 | 54 | 746 | 4 | 90 | 6 |
| Kentucky | 1 | | | 316 | 1 | 3 | 2 |
| Tennessee | 2 | 3 | 45 | 115 | 2 | | |
| Alabama | 1 | | | 281 | 1 | 60 | 2 |
| Mississippi | 1 | 1 | 9 | 34 | | 27 | 2 |
| **West South Central** | 10 | 1 | 293 | 4,043 | 11 | 366 | 20 |
| Arkansas | | | 236 | 333 | 1 | 53 | 1 |
| Louisiana | | | 4 | 50 | 1 | 41 | 6 |
| Oklahoma | 3 | 1 | 53 | 477 | | 24 | |
| Texas | 7 | | | 3,183 | 9 | 248 | 13 |
| **Mountain** | 13 | | 158 | 1,489 | 3 | 70 | 6 |
| Montana | | | 17 | 72 | | 1 | 2 |
| Idaho | | | | 145 | 1 | | |
| Wyoming | | | | 308 | | 2 | |
| Colorado | 11 | | 15 | 253 | | 24 | 1 |
| New Mexico | 1 | | 2 | 144 | | 15 | |
| Arizona | 1 | | 124 | 510 | 2 | 28 | 3 |
| Utah | | | | 54 | | | |
| Nevada | | | | 3 | | | |
| **Pacific** | 8 | | 36 | 5,670 | 8 | 69 | 10 |
| Washington | | | 6 | 1,258 | 3 | 1 | 3 |
| Oregon | 2 | | 16 | 585 | | 28 | |
| California | 6 | | 14 | 3,827 | 5 | 40 | 7 |
| Alaska | | | 22 | | | | |
| Hawaii | | | 4 | 12 | | 1 | |

[1] New York City only. *Anthrax*: California, 1 case; Pennsylvania, 2 cases.

## Reported Cases of Selected Communicable Diseases: United States, Week Ended May 12, 1951—Continued

[Numbers under diseases are International List numbers, 1948 revision]

| Area | Rocky Mountain spotted fever (104) | Scarlet fever (050) | Small-pox (084) | Tulare-mia (059) | Typhoid and para-typhoid fever[1] (040, 041) | Whoop-ing cough (056) | Rabies in animals |
|---|---|---|---|---|---|---|---|
| **United States** | 6 | 1,772 | | 14 | 39 | 1,662 | 191 |
| **New England** | | 165 | | | 2 | 76 | |
| Maine | | 23 | | | | 33 | |
| New Hampshire | | ([2]) | | | | | |
| Vermont | | 2 | | | | | |
| Massachusetts | | 112 | | | 2 | 36 | |
| Rhode Island | | 11 | | | | 3 | |
| Connecticut | | 17 | | | | 4 | |
| **Middle Atlantic** | | 305 | | | 6 | 181 | 8 |
| New York | | [2] 172 | | | 1 | 59 | 1 |
| New Jersey | | 41 | | | 3 | 47 | |
| Pennsylvania | | 92 | | | 2 | 75 | 7 |
| **East North Central** | | 600 | | | 7 | 166 | 22 |
| Ohio | | 124 | | | 1 | 27 | 3 |
| Indiana | | 42 | | | 1 | 33 | 15 |
| Illinois | | 49 | | | 4 | 9 | 1 |
| Michigan | | 333 | | | 1 | 56 | 3 |
| Wisconsin | | 52 | | | | 41 | |
| **West North Central** | | 74 | | 1 | 2 | 80 | 83 |
| Minnesota | | 15 | | | 1 | 12 | 3 |
| Iowa | | 5 | | | | 7 | 8 |
| Missouri | | 24 | | 1 | 1 | 8 | 71 |
| North Dakota | | 2 | | | | 28 | |
| South Dakota | | 2 | | | | 4 | |
| Nebraska | | 4 | | | | 2 | 1 |
| Kansas | | 22 | | | | 19 | |
| **South Atlantic** | 1 | 109 | | | 9 | 195 | 24 |
| Delaware | | 1 | | | | 2 | |
| Maryland | | 19 | | | | 12 | |
| District of Columbia | | 7 | | | | 3 | |
| Virginia | 1 | 14 | | | | 54 | 4 |
| West Virginia | | 23 | | | | | 2 |
| North Carolina | | 31 | | | 3 | 53 | |
| South Carolina | | 3 | | | | 4 | 13 |
| Georgia | | | | | 6 | 29 | 4 |
| Florida | | [2] 11 | | | | 38 | 1 |
| **East South Central** | | 28 | | 3 | 5 | 122 | 29 |
| Kentucky | | 12 | | | 3 | 15 | 11 |
| Tennessee | | 7 | | | 1 | 18 | 14 |
| Alabama | | 8 | | 1 | 1 | 52 | |
| Mississippi | | 1 | | 2 | | 37 | 4 |
| **West South Central** | | 79 | | 9 | 4 | 434 | 25 |
| Arkansas | | 2 | | 2 | 2 | 72 | 2 |
| Louisiana | | 5 | | | 1 | 3 | |
| Oklahoma | | 16 | | | | 16 | 2 |
| Texas | | 56 | | 7 | 1 | 343 | 21 |
| **Mountain** | 5 | 109 | | 1 | | 327 | |
| Montana | | | | 1 | | 8 | |
| Idaho | | 22 | | | | 3 | |
| Wyoming | 3 | 1 | | | | 206 | |
| Colorado | 1 | 11 | | | | 39 | |
| New Mexico | | | | | | 21 | |
| Arizona | | 16 | | | | 42 | |
| Utah | | [2] 59 | | | | 4 | |
| Nevada | 1 | | | | | 4 | |
| **Pacific** | | 303 | | | 4 | 81 | |
| Washington | | 33 | | | | 15 | |
| Oregon | | 35 | | | | 6 | |
| California | | [2] 235 | | | 4 | 60 | |
| Alaska | | 1 | | | | 1 | |
| Hawaii | | | | | 1 | | |

[1] Including cases reported as salmonellosis.

[2] Including cases reported as streptococcal sore throat.

*Psittacosis*: Illinois, 1 case.

# FOREIGN REPORTS

## CANADA

*Reported Cases of Certain Diseases—Week Ended April 28, 1951*

| Disease | Total | Newfound-and | Prince Edward Island | Nova Scotia | New Brunswick | Quebec | Ontario | Manitoba | Saskatchewan | Alberta | British Columbia |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Brucellosis | 4 | | | | | 2 | 2 | | | | |
| Chickenpox | 941 | 1 | | 21 | 1 | 268 | 452 | 39 | 13 | 48 | 98 |
| Diphtheria | 4 | | | | | 4 | | | | | |
| Dysentery, bacillary | 8 | | | | | | 2 | | | | 6 |
| Encephalitis, infectious | 1 | | | | | | | 1 | | | |
| German measles | 484 | 1 | | 108 | | 43 | 234 | 1 | 20 | 28 | 49 |
| Influenza | 47 | | | 6 | 10 | | | 13 | | | 18 |
| Measles | 1,375 | | | 39 | 11 | 266 | 757 | 71 | 25 | 112 | 94 |
| Meningitis, meningococcal | 1 | | | | | | | | | | 1 |
| Mumps | 767 | | | 4 | 2 | 284 | 221 | 40 | 59 | 76 | 81 |
| Scarlet fever | 285 | | | | | 92 | 48 | 29 | 15 | 45 | 56 |
| Tuberculosis (all forms) | 231 | 3 | | 4 | 12 | 137 | 21 | 11 | 5 | | 38 |
| Typhoid and paratyphoid fever | 11 | | | | | 7 | 2 | | | | 2 |
| Venereal diseases: | | | | | | | | | | | |
| Gonorrhea | 252 | 2 | | 7 | 7 | 48 | 44 | 28 | 5 | 43 | 68 |
| Syphilis | 104 | 3 | | 11 | 5 | 35 | 23 | 5 | 4 | 3 | 15 |
| Primary | 7 | | | | | 2 | | 1 | 2 | | 2 |
| Secondary | 10 | | | 3 | 3 | 3 | 1 | | | | |
| Other | 87 | 3 | | 8 | 2 | 30 | 22 | 4 | 2 | 3 | 13 |
| Other forms | 2 | | | | | | | | | | 2 |
| Whooping cough | 133 | | | 5 | 1 | 12 | 50 | 2 | 5 | 39 | 19 |

## JAMAICA

*Reported Cases of Certain Diseases—4 Weeks Ended April 28, 1951*

| Disease | Total | Kingston | Other localities |
|---|---|---|---|
| Chickenpox | 189 | 34 | 155 |
| Diphtheria | 9 | 4 | 5 |
| Dysentery, unspecified | 3 | 2 | 1 |
| Leprosy | 3 | | 3 |
| Ophthalmia neonatorum | 1 | | 1 |
| Scarlet fever | 1 | 1 | |
| Tuberculosis, pulmonary | 84 | 41 | 43 |
| Typhoid fever | 57 | 8 | 49 |
| Typhus fever (murine) | 4 | 2 | 2 |

## MADAGASCAR

*Reported Cases of Certain Diseases and Deaths—February 1951*

| Disease | Aliens | | Natives | |
|---|---|---|---|---|
| | Cases | Deaths | Cases | Deaths |
| Beriberi | | | 80 | |
| Bilharziasis | | | 30 | |
| Diphtheria | 2 | | 3 | 1 |
| Dysentery: | | | | |
| Amebic | 3 | | 147 | 3 |
| Bacillary | | | 89 | 1 |
| Erysipelas | | | 15 | 1 |
| Influenza | 10 | | 1,931 | 8 |
| Leprosy | | | 13 | |
| Malaria | 156 | 2 | 25,866 | 84 |
| Measles | 7 | | 141 | 1 |
| Meningitis, meningococcal | | | 1 | |
| Mumps | | | 80 | |
| Paratyphoid fever | | | 2 | |
| Plague | | | 23 | 16 |
| Pneumonia (all forms) | 3 | 2 | 314 | 33 |
| Puerperal infection | | | 4 | |
| Tuberculosis, respiratory | 6 | 1 | 72 | 12 |
| Typhoid fever | 8 | | 18 | 4 |
| Whooping cough | | | 242 | 3 |

## CEREBROSPINAL MENINGITIS

*Anglo-Egyptian Sudan.* A total of 4,701 cases of cerebrospinal meningitis was reported for the week ended April 28 as compared with 3,730 for the previous week. These cases were chiefly in the provinces of Blue Nile and Kordofan. Approximately 27,800 cases have have been reported since January 1, 1951.

*French Equatorial Africa.* A large outbreak of cerebrospinal meningitis has been in progress in the Chad territory. During March 9,588 cases were reported as compared with 232 for February.

## REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

The following reports include only items of unusual incidence or of special interest and the occurrence of these diseases, except yellow fever, in localities which had not recently reported cases. All reports of yellow fever are published currently. A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

### Cholera

*Indonesia.* Two cases of cholera have been reported in Viet Nam, one for the week ended April 28, 1951, and one for week ended May 5.

### Plague

*Ecuador.* During the period March 16–31, 1951, four cases (one death) of plague were reported in Loja Province.

*Indonesia.* For the week ended April 21, 1951, 12 cases (four deaths) of pneumonic plague were reported in Timbang, Madura.

### Smallpox

*Burma.* During the week ended May 5, 1951, smallpox was reported in ports as follows: Akyab, one case; Moulmein, one; and Rangoon, seven.

*Indochina.* During the week ended May 5, 1951, smallpox was reported in Viet Nam as follows: Haiphong 72 cases, Hanoi 30, and Saigon 1.

*Korea.* During February, 156 cases (33 deaths) of smallpox were reported compared with 39 (4 deaths) for January.

### Typhus Fever

*Korea.* Typhus fever has been reported in Korea as follows: For February—Pusan, 18 cases and Kunsan, 5; for January—Pusan, 4 cases.

*Jamaica.* For the week ended April 28, 1951, two cases of murine typhus fever were reported in Kingston.

### Yellow Fever

*Gold Coast.* During the week ended April 28, 1951, suspected cases of yellow fever were reported as follows: Aboadzi, Sekondi, and Tarkwa, one case each.

## Plague in Wild Rodents in Santa Fe County, N. Mex.

Dr. V. B. Link, Western Communicable Disease Center Laboratory, San Francisco, reports that the specimen N. M. 6140–6141, consisting of 8 fleas, *Monopsyllus wagneri*, from 2 white-footed mice, *Peromyscus truei*, trapped 14 miles southeast of Santa Fe City limits on U. S. Highway 85 on April 18, 1951, was positive for plague. This is the first time that wild rodent plague has been demonstrated in Santa Fe County, New Mexico. The only previous indication of plague in this county was July 1950, when a resident of Glorieta died of plague. The rodents being reported upon were trapped about 3 miles from the residence of the 1950 victim.

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It contains (1) current information regarding the incidence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

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# Public Health Reports

VOLUME 66 JUNE, 8 1951 NUMBER 23

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FEDERAL SECURITY AGENCY

PUBLIC HEALTH SERVICE

**FEDERAL SECURITY AGENCY**
***Oscar R. Ewing, Administrator***

**PUBLIC HEALTH SERVICE**
***Leonard A. Scheele, Surgeon General***

**Division of Public Health Methods**
***G. St. J. Perrott, Chief of Division***

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# Public Health Reports

*Vol. 66* • JUNE 8, 1951 • *No. 23*

## Weight Control—A Simplified Concept

By A. L. CHAPMAN, M. D.*

Sevringhaus defines obesity in this manner: "Obesity is an excess of fat over the normal expected for the height, age, and sex . . ." (*30*). In all but a very small percentage of overweight people, the condition is brought about through a combination of overeating and inactivity (*23*).

Each generation has to rediscover these basic facts. Each generation exhibits some new concept of obesity which represents an attempt to avoid the harsh fact that only bv prolonged re-education of obese people can normal eating habit patterns be restored and obesity ended.

The prevalence of obesity is high. A study of obese employees of the Metropolitan Life Insurance Co. in 1931 provided one clear indication of this fact (*13*). Out of 7,530 home office employees, 558 (7.4 percent) were 20 percent or more overweight. One hundred and twenty persons (1.6 percent) were 40 percent overweight. These were approximately the same percentages found among policyholders.

In 1939, a study of physical impairments among 10,000 unselected examinees for life insurance disclosed that approximately 28 percent of this group were 10 percent or more overweight (*12*). Obesity was the most frequent physical abnormality found. These findings of 10 and 20 years ago are confirmed by the results of recent studies. A Boston report of the examination of 3,000 "apparently well" adults in a health protection clinic showed that 18 percent were 20 percent or more above their optimum weight (*28*). The weighing and measuring of 562 persons who attended the annual meeting of the American Public Health Association in St. Louis in 1950 revealed that 40 percent of the men and 20 percent of the women were 10 percent or more above the ideal weight for persons of medium frame in their height range.

The prevalence of serious obesity (10 percent above average weight for sex and height) tends to increase directly with age. Dublin first reported this fact in 1925 after physical examinations of 16,662 male

*Regional Medical Director, Region III, Public Health Service, Federal Security Agency.

policyholders in the Metropolitan Life Insurance Co. (*7*). The prevalence at age 25 was found to be 4.9 percent, and at age 55 it had increased to 19.8 percent.

Study after study has shown that the mortality rates among obese people are higher than among people of normal weight. Overweight tends to shorten life. As early as 1930, Dublin had shown that 50 pounds of excess weight at age 50 increased the death rate by 56 percent—1 percent per pound—and that in those who were 100 pounds overweight the death rate was increased more than 100 percent (*8*). Even overweight persons accepted for life insurance have a mortality rate appreciably above that of their slimmer fellows (*21*).

That the rising risk from obesity increases with age (*8*) is pointed out by Joslin (*19*). He calculates that of ten fat men at age 30, six will survive to 60, three to 70, and perhaps one to 80. Of ten lean men, eight reach 60, five reach 70, and three will probably become octogenarians. This increased death rate is due primarily to the increased prevalence of the degenerative diseases in the overweight person.

Statistics published by the Metropolitan Life Insurance Co. in 1943 show that of men in whom diabetes began after the age of 35 more than 80 percent were overweight *before* the onset of the disease (*22*, *10*). These data also show that the death rate from diabetes among men 25 percent or more overweight is eight times as high as among average weight persons. Thus, diabetes and obesity are linked closely together.

During World War II, a small but interesting study of fatal coronary attacks in young soldiers showed that 73 (or 91 percent) of 80 young men between the ages of 20 and 36 who died of coronary arteriosclerosis were overweight. Only two were thin men (*15*). Obesity is known to play a harmful role in arthritis and other bone and joint diseases. Danoski states that arthritis is adversely affected by overweight (*6*). Dublin translates the bad effects of obesity on the cardiovascular system in terms that are easily understood. He states that 50 pounds overweight at age 45 impose as much extra mortality as does valvular heart disease (*9*). This is particularly significant in view of the emphasis which is being placed on the control of heart disease today.

Insurance studies have demonstrated that sustained hypertension occurs more than three times as often in overweight persons as in others (*26*); that the mortality from surgical procedures is higher in the overweight; and that the incidence of many other diseases and conditions is greater among the obese. Typical of these conditions are biliary tract disease, joint disease, intertrigo, varicose veins, and hernia (*29*). Even cancer (*9*) and accidents (*8*) are slightly more

likely to occur among the obese. The statistical evidence that highlights the adverse effect excess weight plays in our daily living continues to increase.

To date, great dependence has been placed on the dietary approach to weight control. Diets of all degrees of complexity have been distributed to fat people. The results from attempts to manage overweight patients by medication and dietary advice alone have been exceedingly poor (*1, 5, 6, 16, 18, 24, 27, 29*).

Most fat people say that they are fat because they eat too much, and, to varying degrees, they attribute their difficulties in weight control to a deficiency in "will power." Analysis of 200 questionnaires filled out by applicants for admission to groups in a pilot study for weight control in Boston showed that 145 persons (72.5 percent) indicated overeating as a major cause of their excess weight; 142 (71 percent) had tried to control their weight previously and had failed; and 98 (67.5 percent) had an inkling that their overeating had an emotional or psychological basis (*17*). One thing apparently had been lacking among these people—motivation to lose excess weight.

In an article entitled, "Psychological Aspects of Obesity," Hilde Bruch makes this illuminating observation, "In those happy-go-lucky fat people whom I have had the opportunity to observe, the joviality and often boisterous cheerfulness was nothing but a thin veneer put on for the benefit of the public, a compensatory defense against underlying feelings of unhappiness and futility" (*4*).

In other words, fat people simply are not happy. They employ a camaraderie reactive defense mechanism unconsciously designed to mask their underlying tenseness, frustration, and uncertainty. It is this underlying tension, this lack of emotional equilibrium, this desire to achieve satisfaction in an unsatisfactory life, that drives the overweight to overindulgence in food. They seek comfort in overeating in the face of failure and of frustrating experience.

Freed has stated that "psychologic drives are paramount, since the tendency to overeat is a strong drive for oral gratification and that any nervous or psychic tension of the person will cause an aggravation of this tendency." He feels that "treatment should be based on an understanding of the psychologic factors" (*14*). In this opinion, he is supported by Charlotte Babcock who agrees that food is frequently used by some individuals for purposes other than physiological (*2*).

Richardson feels that obesity often may be regarded as the physical expression of a neurosis and that, with several notable exceptions, there is little basis for the theory of obesity being associated with endocrine disturbances (*25*). He concludes that obesity can be regarded as a component of a neurosis, the physical expression of which is the accumulation of fat.

Another authority in agreement with the psychological approach to

obesity control is Nicholson, who concludes "that psychotherapy and the re-establishment of proper dietary habits are essential for permanent weight reduction" (*24*). In one study, he treated 93 private medical clinic patients for obesity, 38 of whom received only psychotherapy. After a year or more there were 26 successes and 12 failures. Thirty-five were treated by diet therapy alone; in this group there were nine successes and 26 failures. None of the 20 patients who receive amphetamine sulfate or thyroid alone maintained a weight reduction.

Normally, appetite decreases when activity is limited. There appears to be no physiological reason, therefore, why obese people should overindulge in food. The cause of this overindulgence must be looked for elsewhere than in the field of physiology. The failure of medication and diet therapy to control obesity on a long-term basis could be predicated on the fact that obesity is not entirely the result of aberrant physiology.

A strong case for the psychological basis for obesity has been made by several investigators. Bayles points out some of the nonmetabolic satisfactions derived from food (*3*). Among these is simple gratification of a need for pleasure. To those men who were once poor and hungry, plenty of good food may symbolize success. To a bored housewife, food may represent diversion. To those with social ambitions, overeating may become the price paid for social acceptance. Food may even substitute for love; and it definitely has been shown to relieve tension, at least temporarily.

Since the obese person obviously eats more than his body has normal need for, it seems logical to look for the basic cause of obesity among the nonmetabolic, nonnutritional, or psychological and emotional reasons for overeating.

If we accept the thesis that overweight is a condition that most frequently stems from psychological factors, we face the problem of how to approach the obese individual for the purpose of controlling his obesity. Obviously advice, diets, and prescriptions will not serve to change the often chronically maladjusted habit patterns that exist. The obese person has to be motivated to want to be thin and to want to stay thin.

One method of utilizing psychotherapy is on a group basis. This may provide a practical method of offering assistance in meeting the needs of the 30,000,000 people in this country who are estimated to be 10 percent overweight, or even the 15,000,000 people whose excess weight exceeds 20 percent.

Speaking of short-term group psychotherapy, Kotkov points out that the group psychotherapist acts as a "catalytic agent" of the group. Every now and then he emerges from the background and helps to release the powerful emotional potential present in the group.

From the observations and conclusions of many workers in the field of weight control, typified by those cited above, the following basic concepts emerge:

1. The prevalence of obesity in the United States is high.

2. Obesity is associated with an increased death rate.

3. Obesity is associated with an increased prevalence of and death rate from the degenerative diseases.

4. Attempts to control obesity on a long-term basis through a nutritional approach have not been widely successful.

5. There is substantial evidence that frequently obesity is not only a nutritional problem, but a psychological problem as well.

6. Individual psychotherapy has been shown in limited experiments to be effective in weight control, but only the group approach is practical if large numbers of obese people are to be benefited.

7. The crux of the control problem is to motivate people to want to be thin and to want to stay thin.

In formulating an exploratory weight-control program in Boston in cooperation with the Boston Dispensary and the Massachusetts State Health Department, these seven basic concepts were applied by the Public Health Service.

The first announcement that groups were to be formed to help people who had not been able to lose weight through their own efforts brought a deluge of phone calls and letters from more than 200 applicants. Admission to these groups was predicated on two requirements: the approval of the private physician concerned, and a true desire on the part of the applicant to lose weight. As an experimental project, the groups—nine in all—met weekly for a period of 16 weeks.

One of the most important accomplishments among the members of these groups has been the reassurance that weight reduction can be achieved. Most applicants had tried unsuccessfully to follow diets. Some had taken reducing drugs, and some had subscribed to various fads. Most of them had lost faith in the idea that weight reduction, for them, was possible.

The group leaders who have served thus far have come from different backgrounds and have possessed different types of skills. Two were psychologists, two were teachers, one was a psychiatrist, two were nutritionists, one was a minister, two were physicians, and one was a graduate student in psychology.

Group leaders have been selected on the basis of their experience and interest in group leadership. The first of these groups was supported through the use of cooperative funds. The group leader seems to hold the key to the success or failure of these groups. Although he remains pretty much in the background, it is he who adroitly keeps discussion alive, fosters audience participation, and serves as a "catalyst" (*20*).

Nutritional advice has been made available to the members of each group as they have felt the need for help and have requested it.

Following the completion of the 16-week course, many of the group members have continued to meet on an informal, intermittent basis. Arrangements for group leaders, space, and other facilities have been made to encourage continuation of these meetings.

Studies of the method can be developed at minimal expense by local health departments and other agencies that may be concerned with problems of public health.

Although this group approach to weight control is still exploratory, it appears to be based upon sound principles. The effective development of this economical method of mass application of sound weight control principles may do much to lessen obesity throughout the Nation.

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# Sources of Morbidity and Mortality Material in Industrial Health

By Victoria M. Trasko*

Our need for morbidity and mortality statistics is aptly summarized in the familiar quotation that appears in Public Health Reports—"No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring." Applicable in those early days of what we came to call "communicable disease consciousness," these words still hold true for the many new public health programs that since have come into prominence and that, to a lesser or greater degree, have been dependent on the life blood of reports—or to use a broader term, statistics. Among these programs, industrial hygiene in the past decade or two has witnessed a spurt of growth which may be largely attributable, in one sense, to the evidence furnished by statistics.

Attention was first directed to this field through facts uncovered in the early pioneering general sickness surveys as well as studies of occupational diseases. The information brought to light the interest of governmental and other agencies in conducting research and in helping industry to raise the health level of the worker and to improve working conditions. As a result, today, we have official industrial hygiene agencies in practically every State and in a dozen local jurisdictions. They employ over 500 professional workers whose basic function is the evaluation and elimination of health hazards in industry. Unknown numbers are also employed by private industry and nonofficial groups.

Because of the changing nature of American industry—changing technological processes as well as labor turnovers—the job of industrial hygiene personnel is a demanding one. In carrying out his work, the industrial hygienist must be alert to any development—whether it be a new instrument, a new technique, or new data—that will help him.

A frank appraisal reveals that there is little recent, or, as a matter of fact, old material on industrial morbidity and mortality statistics in this country (*1*). The knowledge we have of the apparent effect of the occupation and the working environment on the health of workers, especially when coupled with socioeconomic factors, was

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handed down years ago. This lack of up-to-date information is a serious obstacle, particularly in determining the effectiveness of control programs initiated since that time.

Since the industrial hygienist is concerned in his proper total attitude, first, with the control of occupational disease hazards and, second, with the maintenance of the complete health of the worker, he is interested primarily in data on three basic types of disabilities: occupational diseases, occupational accidents, and nonoccupational illness.

## Occupational Diseases

In carrying out his primary responsibility—the investigation and prevention of occupational diseases—the industrial hygienist must seek information on the prevalence and causes of occupational disease in order that he may effectively plan and evaluate control measures. Current information, however, is scanty and consists of officially reported cases, data uncovered in scientific studies of industrial health hazards, and independent accounts of disease experiences.

The official reporting requirements vary from State to State. Today we find that occupational diseases are reportable by physicians to health departments in 24 States and to labor departments in 2 States. In 12 States, workmen's compensation laws carry separate provisions requiring that reports be made to the compensation authority by employers, and sometimes by physicians. In the 28 other States that provide compensation for disability from occupational diseases, the reporting is implied in the filing of claims or is subject to the same conditions as reporting of "injuries." Thus, in some States, reporting is mandatory to two separate agencies. Only three States in this country have no reporting requirements whatsoever.

Yet, this seeming abundance of information is deceptive, for closer analysis reveals that both the extent and character of the reporting are usually disappointing. In fact, one is forced to the conclusion that occupational disease reporting, even when backed by compensation requirements, in reality is much more unsatisfactory than communicable disease reporting. Difficulties lie not only in the methods of reporting and in ineffective enforcement, but also in the lack of uniform criteria for an acceptable definition of occupational diseases as contrasted with injuries, and in recognition of such diseases by practicing physicians.

Because of the paucity of the data, the reports do not lend themselves to statistical analysis other than an enumeration by cause and number. Listings of all cases coming to the attention of official industrial hygiene divisions are usually included in their annual reports of activities. The Industrial Hygiene Foundation of Pittsburgh also publishes summaries for a few States in its monthly Industrial Hygiene Digest. Notable among the few States providing more comprehensive

data, the California Department of Industrial Relations refers to the Bureau of Adult Health between 12,000 and 15,000 "first" reports of occupational diseases a year reported by physicians attending injured workers. The Bureau analyzes the reports annually and publishes the results in its Occupational Health Bulletin.

Published reports of compensation authorities provide some information on occupational diseases, but this is chiefly in reference to their compensability. Consequently, they are not truly suitable for statistical evaluations of disease prevalence. Occupational diseases are sometimes listed separately, but more commonly they are lumped into one group or combined with "injuries."

By far a more significant source of material on industrial morbidity lies in the reports of scientific studies of health hazards in industry. Such studies have been made during the past 35 years by the Public Health Service in cooperation with other Federal and State agencies, and by some State industrial hygiene divisions. Among the better-known ones, for example, is the series of some 15 studies of workers in the dusty industries which have been made during the past 20 years. In addition to the evaluation of the working environment as a causative factor in disease, the published reports give data on the general physical condition of the workers and on the prevalence of any and all occupational diseases, and of other diseases, such as affections of the respiratory system, as determined by the physical examination. Data are frequently included on the nature and severity of disabling illness, and on occupational mortality. Each study represents a careful and detailed observation of at least 1,000 persons.

A complete list of such studies may be found in the published bibliographies of the Public Health Service (*2*, *3*). In reality these studies offer the best sources of industrial morbidity material we have in this country. They are statistically sound, and scientifically they point up the gravity of the occupational disease problem typical of the industry under study—such as anthracosilicosis among hard coal miners, lead poisoning among storage battery workers, silicosis among granite workers, and so on.

The third source of material on occupational diseases consists of the many published accounts of the occurrence of isolated cases and specific disease (*4–12*). These accounts deal chiefly with clinical and preventive aspects and are not productive of any quantitative morbidity data. Along with reviews of the literature, they provide valuable and abundant information for the industrial hygienist on the actual occurrence of diseases, their causes, treatment and control, as well as the results of research and toxicological investigations. To some extent, then, limitations in statistical material are offset by the scientific knowledge thus gained of specific diseases.

Also worthy of mention are the few epidemiological studies of the

incidence of single diseases. One of these reports is the Public Health Service study of 32,000 cases of dermatitis reported by seven States during 1938–43 (*13*). The anthrax problem has also been the subject of several reports, one of which is the 20-year survey of anthrax in the United States by the Committee on Industrial Anthrax of the Industrial Hygiene Section of the American Public Health Association (*14*); another is the epidemiological study of anthrax in Philadelphia's industries reported during 1931–40 (*15*). The Public Health Service also completed recently a study of the problem (*16*). These and similar reports (*17*, *18*), few in number, are typical of the sources of quantitative material on occupational diseases in this country.

## Sickness Absenteeism

In carrying out the second objective of an industrial health program, that of maintaining the total health of the worker, the industrial hygienist becomes concerned with illness common to the general population. These nonoccupational illnesses account for the great bulk of sickness absenteeism in industry, exacting an estimated toll of 400 to 500 million man-days annually. This loss of time from work because of general illnesses, such as respiratory diseases, digestive disorders, and certain chronic diseases, is many times greater than the total amount of time lost from accidents and occupational diseases combined. Thus, absence from work due to general illness is recognized as one of the most important problems with which industry as well as the industrial hygienist has to cope.

An over-all picture of sickness is found in the sickness surveys of the general population. They are of interest to the industrial hygienist in that they furnish fundamental evidence on the apparent influence of the occupation and socioeconomic factors on the general health of the worker. Familiar surveys made in the past, whose findings bear on the prevalence of disabling illness, are the early Hagerstown studies (*19*), the Committe on Costs of Medical Care Survey of 9,000 families in 1928–31 (*20*), the National Health Survey of 1935–36 (*21*), the Baltimore Chronic Diseases Study (*22*), and the Census Bureau's population survey of 25,000 families of February 1949 (*23*) which ascertained the amount of disability on the day of enumeration and was repeated in September 1950.

Narrowing down the picture to studies of the industrial population, analyses of records of sick benefit and group insurance organizations and, to a limited extent, records of plant medical departments furnish the industrial hygienist with more usable data on sickness experience. Even from these sources, however, statistics of only a general informative nature are obtainable. The analysis of such records is confined to a very few agencies (*1*, *2*, *3*, *24*, *25*) and companies in this country, of which the Public Health Service is one.

The Division of Industrial Hygiene of the Public Health Service has been collecting and analyzing sickness records of a group of sick benefit organizations since about 1920. Results of the analyses of these records on duration and cause of disabling illness for the reporting companies are published periodically, and, as time permits, special reports are issued. Since 1936, for example, close to 100 reports have been published by the Public Health Service on this subject (*2*, *3*). These reports reveal trends in incidence of specific diseases, such as respiratory affections, and the chronic diseases, and afford some knowledge of the success being made in their control.

The American College of Surgeons also published limited statistics on the amount of time lost from sickness of all kinds (*26*). Their information is based on reports collected from several hundred companies keeping such records.

Morbidity material of most practical use to the industrial hygienist, however, is found in disability statistics of individual companies. Unfortunately, only a few large companies and organizations analyze their own sickness experience and publish results in professional journals (*27–32*). Sickness statistics of this type are valuable, for they provide a definitive picture of occupational health problems of the plant at a given time. In this way, specific health problems can be determined and the effectiveness of the plant health program may be evaluated.

The official industrial hygiene agencies themselves are limited as a source of material. Two State health departments—Tennessee and New Hampshire—currently collect and analyze reports of sickness absenteeism for a small group of industries in their areas. Several other States collected such reports in the past but no longer do so because of pressure of other work and personnel shortages.

## Occupational Accidents

Two other types of materials on morbidity and mortality remain for brief comment—occupational accidents and mortality statistics. Accident statistics are important criteria to the industrial hygienist in determining the extent and nature of industrial health and safety problems.

The most fruitful sources of accident data in this country are the United States Bureau of Labor Statistics and the National Safety Council. Quarterly reports on injury rates in manufacturing industries and separate reports of work-injury experiences of special industries are released by the Bureau of Labor Statistics (*33–35*). The National Safety Council (*36*) annually publishes injury frequency rates of reporting industries as well as information on causes of accidents.

## Mortality Statistics

Industrial mortality statistics in this country are also meager. The most recent source on mortality rates according to broad groups of occupation is still the well-known publication of the National Tuberculosis Association of New York City, entitled Death Rates by Occupation (*37*, *38*), based on mortality statistics of 1930 in 10 States.

The Metropolitan Life Insurance Co. makes available from time to time proportionate mortality statistics by occupation for insured wage earners (*39*) and publishes monthly death rates from selected causes for industrial policyholders in its Statistical Bulletin. Occupational death rates are published in the Joint Occupation Study of the Actuarial Society and the Association of Life Insurance Medical Directors (*40*), but this study is chiefly from an actuarial point of view. An attempt to compile occupational mortality statistics on a State-wide basis from official death certificates is exemplified by the work of the Tennessee Department of Public Health (*41*).

The few sources of occupational mortality material available provide ample evidence that certain occupational groups experience excessive death rates from certain diseases. One notable example is the close relationship between tuberculosis of the respiratory system and occupations involving exposure to silica dust.

## New Sources of Material

In view of the fragmentary nature of industrial morbidity and mortality statistics available in this country, the question then comes to one's mind: What attempts are being made to improve the present situation?

First, to meet the long-felt need for uniform and adequate reports of occupational diseases, the Division of Industrial Hygiene of the Public Health Service began in January 1950, a pilot study as the first step in ascertaining the feasibility of developing a Nation-wide collecting system. Ten States, each with various reporting practices, are participating in this 2-year study. The plan being tested calls for the industrial hygiene agencies in these States to transmit occupational disease information directly to the Division of Industrial Hygiene of the Public Health Service, which is serving as a central collection agency. It is hoped that the results of the 2-year study will furnish evidence on the fundamental nature of difficulties characteristic of current reporting practices and problems and offer data for setting up much needed criteria on reporting and diagnosing occupational diseases, and, to some extent, on prevalence statistics.

Second, the National Office of Vital Statistics is undertaking an occupational and industrial mortality study on the basis of the 1950

census data. This should fill the gap in our present knowledge on occupational mortality and provide industrial hygiene agencies with recent and usable data.

And finally, a potential source of current information on morbidity may eventually be found in the records kept in connection with State disability insurance programs under which the worker receives a cash benefit while he is unable to work because of illness. At the present time, laws are in operation in Rhode Island, California, New Jersey, and New York. There is a tendency in existing and proposed legislation of this type to make employers pay part of the cost of the insurance system. Faced with this cost, there is no doubt that companies will be more interested in establishing medical care programs for their workers and, consequently, in knowing the causes of disabling sickness. Success in utilizing disability insurance records of this type, particularly in ascertaining costs and incidence of illness, has been experienced by the Railroad Retirement Board during the 3 years of operation of its sickness benefit program (*42*).

In summary, we find that the industrial morbidity and mortality statistical picture is circumscribed by real limitations. These limitations, however, can be partly offset if they are understood and the available data used judiciously.

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# Poliomyelitis, Hospital Inquiry, England and Wales, 1949

By W. H. Bradley, D.M., M.R.C.P., and A. H. Gales, D.M.*

In recent years the Ministry of Health has made two surveys on poliomyelitis cases admitted to hospitals in England and Wales. In 1947 a questionnaire, sent to some 300 hospitals and bringing 270 replies, was confined mainly to a purely statistical summary, except for questions relating to use of respirators and the effect of pregnancy.[1] In 1949 a similar questionnaire, sent to all regional hospital boards and boards of governors of teaching hospitals, was expanded to get further information on the use of respirators and the number of poliomyelitis cases occurring in pregnant women. In addition, information was sought on: (1) the number of cases occurring in persons who had had a tonsillectomy within 2 months of onset; (2) the number of cases occurring in persons who had received an injection or vaccination within 2 months of onset; and (3) incidents which suggested cross infection in the hospital.

Hospitals were asked to include all cases admitted in 1949. A detailed analysis of the cases is given in table 5.

## General Statistics

### *Size of Sample*

The returns received in 1949 relate to 7,832 patients admitted, and in 5,423 (69 percent) the diagnosis of poliomyelitis or polioencephalitis was accepted by the hospitals. The remaining 2,409 were classified "Not poliomyelitis or polioencephalitis." The 5,423 accepted hospital cases may be compared with the total "corrected" civilian notifications for the year of 5,920 (see table 3). Exact correspondence could not be expected but it appears that the survey covered most of the cases which occurred in England and Wales in 1949.

### *Age Incidence*

Table 1 shows that 37 percent of the confirmed cases were under 5

*Ministry of Health, London. Condensed from the Monthly Bulletin of the Ministry of Health and the Public Health Laboratory Service, October 1950, pp. 216–220 and November 1950, pp. 242–247, by permission of the Controller, H. B. M. Stationery Office. Parts I and II have been combined in this presentation.

[1] The results of the 1947 survey were reported in the Monthly Bulletin of the Ministry of Health and Public Health Laboratory Service, vol. 7, March 1948, p. 56, and reprinted in Public Health Reports, vol 63, March 1948, pp. 397–400.

years old, 33 percent between 5 and 15, and 30 percent were over 15 years of age. This table also shows that 18 percent of all deaths occurred in children under 5, 24 percent in children between 5 and 15, and 58 percent in persons over 15.

*Sites of Paralysis*

Among the 5,423 confirmed cases 3,707 patients (68.4 percent) had paralysis chiefly affecting the limbs or trunk; 599 (11.0 percent) had paralysis chiefly affecting cranial nerves; 1,002 (18.5 percent) had no paralysis but were diagnosed on the changes in the cerebrospinal fluid (726 cases) or on clinical grounds only (276). In 115 patients (2.1 percent) the symptoms and signs were indefinite but the diagnosis was made because of close contact with a definite case.

*Severity* [2]

The degrees of severity of the 4,306 (3,461) paralytic cases were as follows: 481 (333) were fatal; of the 3,825 (3,128) in which the patient recovered, 1,550 or 40.5 percent (1,285 or 41.1 percent) were classed as slight—not likely to interfere with normal life nor to require long stay in-patient hospital treatment; 1,472 or 38.5 percent (1,205 or 38.5 percent) as of moderate severity—likely to need long-stay hospital treatment but with good prospect of an ultimate return to normal life; and 803 or 21.0 percent (638 or 20.4 percent) as severe—not likely to return to normal life.

Table 1. *Number and percentage of cases and deaths, case fatality rate, and percent of cases with paralysis, by age*

| Age | Cases | | Deaths | | Case fatality rate (percent) | Percent with paralysis |
|---|---|---|---|---|---|---|
| | Number | Percent | Number | Percent | | |
| Under 1 year | 237 | 4.4 | 17 | 3.4 | 7.2 | 92.4 |
| 1–4 | 1,770 | 32.2 | 76 | 15.0 | 4.2 | 85.8 |
| 5–14 | 1,771 | 32.7 | 121 | 24.0 | 6.8 | 72.7 |
| 15–24 | 835 | 15.4 | 108 | 21.4 | 12.9 | 74.4 |
| 25–34 | 509 | 9.4 | 105 | 20.8 | 20.6 | 80.0 |
| 35–44 | 223 | 4.1 | 57 | 11.3 | 25.6 | 82.5 |
| 45 and over | 78 | 1.4 | 21 | 4.2 | 26.9 | 85.9 |
| All ages | 5,423 | 100.0 | 505 | 100.0 | 9.3 | 79.4 |

The age distribution of the 2,275 patients who survived in 1949 with either moderate or severe paralysis is given in table 2.

In table 3 notifications in 1949 are compared with the returns obtained from hospitals in the same year. The results of this inquiry can therefore be related to the total experience of the country.

Table 4 shows how patients fared after admission to hospitals in 1949 and in 1947. It is, of course, impossible to be sure until many months have elapsed how severe the ultimate paralysis will be, and these figures must be accepted with that reservation.

It must be remembered that when an epidemic is in progress the

[2] The figures in parentheses in this paragraph are taken from the survey for 1947.

early reports of numbers of cases generally relate to patients admitted to hospitals and that it is likely that such reports will exaggerate the true number of cases by nearly one-third.

## Treatment in Respirators

In all, 560 patients were treated in respirators at some time during the year—213 were treated temporarily; 29 were likely to need permanent treatment in a breathing machine, and 318 died. On December 31, 32 patients (19 males and 13 females) were being treated in respirators. It is impossible to decide in the early stages of treatment in a respirator whether such treatment is likely to be permanently necessary. It is also impossible to prophesy how long the patient will survive. It would appear, however, that the number of respirators likely to be required for a long period for patients in hospitals at the end of 1949 did not exceed 30.

Table 2. *Age distribution of paralytic cases who survived, 1949*

| Age group | Number | Percent | Age group | Number | Percent |
|---|---|---|---|---|---|
| Under 1 year | 156 | 6.9 | 25–34 | 187 | 8.2 |
| 1–4 | 848 | 37.3 | 35–44 | 80 | 3.5 |
| 5–14 | 668 | 29.4 | 45 and over | 24 | 1.1 |
| 15–24 | 312 | 13.7 | Total | 2,275 | 100.1 |

Table 3. *Poliomyelitis and polioencephalitis: England and Wales, notifications for 1949, compared with cases reported in the hospital inquiry, 1949*

| Age group (years) | Males | | | Females | | | Total | | |
|---|---|---|---|---|---|---|---|---|---|
| | Notifications | Hospital inquiry | Difference | Notifications | Hospital inquiry | Difference | Notifications | Hospital inquiry | Difference |
| Under 5 | 1,217 | 1,146 | 71 | 946 | 861 | 85 | 2,163 | 2,007 | 156 |
| 5–14 | 1,160 | 1,028 | 132 | 847 | 743 | 104 | 2,007 | 1,771 | 236 |
| 15 and over | 911 | 873 | 38 | 839 | 772 | 67 | 1,750 | 1,645 | 105 |
| Total | 3,288 | 3,047 | 241 | 2,632 | 2,376 | 256 | 5,920 | 5,423 | 497 |

Table 4. *Expectation of paralysis or death in a notified case of poliomyelitis*

| Admissions | 1949 | Percent of total admissions | 1947 | Percent of total admissions |
|---|---|---|---|---|
| Total | 7,832 | 100 | 6,762 | 99.9 |
| Not poliomyelitis | 2,409 | 30.8 | 2,045 | 30.2 |
| Nonparalytic recovered | 1,093 | 13.9 | 1,229 | 18.2 |
| Paralytic: | | | | |
| Slight | 1,550 | 19.8 | 1,285 | 19.0 |
| Moderate | 1,472 | 18.8 | 1,205 | 17.8 |
| Severe | 803 | 10.3 | 638 | 9.4 |
| Died | [1] 505 | 6.4 | [2] 360 | 5.3 |

[1] 24 deaths in nonparalytic cases.
[2] 27 deaths in nonparalytic cases.

## Table 5. *Detailed analysis of hospital inquiry*

| Status | Males: Under 1 year | Males: 1-4 | Males: 5-14 | Males: 15-24 | Males: 25-34 | Males: 35-44 | Males: 45 and over | Males: Total | Females: Under 1 year | Females: 1-4 | Females: 5-14 | Females: 15-24 | Females: 25-34 | Females: 35-44 | Females: 45 and over | Totals |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total cases | 169 | 1,357 | 1,597 | 643 | 339 | 195 | 108 | 4,408 | 130 | 956 | 1,086 | 546 | 416 | 168 | 92 | 3,424 |
| Paralytic: | | | | | | | | | | | | | | | | |
| Limbs and/or trunk: | | | | | | | | | | | | | | | | |
| Slight | 21 | 305 | 222 | 104 | 47 | 17 | 10 | 726 | 22 | 225 | 184 | 71 | 46 | 28 | 10 | 586 |
| Moderate | 59 | 309 | 216 | 94 | 39 | 30 | 5 | 752 | 41 | 241 | 174 | 78 | 57 | 16 | 4 | 611 |
| Severe | 31 | 173 | 144 | 91 | 64 | 39 | 12 | 554 | 31 | 114 | 131 | 90 | 75 | 28 | 9 | 478 |
| Total | 111 | 787 | 582 | 289 | 150 | 86 | 27 | 2,032 | 94 | 580 | 489 | 239 | 178 | 72 | 23 | 1,675 |
| Other: | | | | | | | | | | | | | | | | |
| Slight | 5 | 42 | 67 | 14 | 9 | 1 | 2 | 140 | 1 | 34 | 31 | 13 | 15 | 3 | 1 | 98 |
| Moderate | 2 | 15 | 24 | 8 | 2 | 2 | 3 | 56 | 5 | 14 | 18 | 5 | 5 | 4 | 2 | 53 |
| Severe | ---- | 25 | 49 | 28 | 27 | 10 | 6 | 145 | 1 | 22 | 29 | 25 | 21 | 6 | 3 | 107 |
| Total | 7 | 82 | 140 | 50 | 38 | 13 | 11 | 341 | 7 | 70 | 78 | 43 | 41 | 13 | 6 | 258 |
| Nonparalytic: | | | | | | | | | | | | | | | | |
| With changes in CSF | 5 | 96 | 190 | 89 | 32 | 12 | 4 | 128 | 5 | 66 | 128 | 58 | 32 | 7 | 2 | 298 |
| With clinical signs only | 3 | 31 | 83 | 31 | 15 | 10 | ---- | 173 | 1 | 24 | 36 | 22 | 10 | 7 | 3 | 103 |
| Total | 8 | 127 | 273 | 120 | 47 | 22 | 4 | 601 | 6 | 90 | 164 | 80 | 42 | 14 | 5 | 401 |
| Presumptive | 2 | 22 | 33 | 6 | 6 | 3 | 1 | 73 | 2 | 12 | 12 | 8 | 7 | ---- | 1 | 42 |
| Not poliomyelitis nor polioencephalitis | 41 | 339 | 569 | 178 | 98 | 71 | 65 | 1,361 | 21 | 234 | 343 | 176 | 148 | 69 | 57 | 1,048 |
| Fatal cases (included in figures above): | | | | | | | | | | | | | | | | |
| Paralytic: | | | | | | | | | | | | | | | | |
| Limbs and/or trunk | 6 | 15 | 33 | 29 | 33 | 24 | 6 | 146 | 7 | 13 | 20 | 30 | 25 | 16 | 7 | 118 |
| Other | ---- | 22 | 41 | 23 | 25 | 7 | 5 | 123 | 1 | 15 | 23 | 25 | 20 | 8 | 2 | 94 |
| Total | 6 | 37 | 74 | 52 | 58 | 31 | 11 | 269 | 8 | 28 | 43 | 55 | 45 | 24 | 9 | 212 |
| Nonparalytic | ---- | 7 | 2 | ---- | 2 | ---- | ---- | 11 | 3 | 4 | 2 | 1 | ---- | 2 | 1 | 13 |
| Total fatal cases | 6 | 44 | 76 | 52 | 60 | 31 | 11 | 280 | 11 | 32 | 45 | 56 | 45 | 26 | 10 | 225 |
| All patients treated in respirator (1949): | | | | | | | | | | | | | | | | |
| Temporarily | 1 | 35 | 28 | 22 | 12 | 4 | 1 | 103 | 4 | 16 | 40 | 29 | 17 | 3 | 1 | 110 |
| Permanently | 1 | ---- | 3 | 5 | 1 | ---- | ---- | 10 | ---- | 1 | 8 | 4 | 3 | 3 | ---- | 19 |
| Died | 4 | 20 | 37 | 42 | 43 | 24 | 6 | 176 | 6 | 12 | 23 | 47 | 31 | 17 | 5 | 141 |
| Total cases | 6 | 55 | 68 | 69 | 56 | 28 | 7 | 289 | 10 | 29 | 71 | 80 | 51 | 23 | 6 | 270 |

NOTE: *Paralytic* includes all cases which have had any muscle weakness or paralysis, even if this was transient. *Limbs and/or trunk* means cases in which spinal paralysis is the predominant feature. *Other* means cases in which bulbar or cranial nerve paralysis is predominant.

## Additional Information

The exact form of the questions asked in regard to pregnancy, tonsillectomy, injections or vaccinations, and cross infection in the hospital is given at the beginning of the section devoted to each heading. As a result of the experience gained in this inquiry it seems clear that too much should not be expected of an inquiry of so large a scope. It is probable that the information about pregnancies was reasonably comprehensive, but it was probably not so comprehensive on some of the other points.

Thus, at the time when the inquiry was made, for example, there had been no publications on the association between inoculations and poliomyelitis. It was not therefore generally known that some relationship was suspected, and the history of inoculation, even if it had occurred, was by no means certain to have been inquired into or to have been recorded.

The question about cross infection, although it elicited some interesting information, was difficult to frame in a sufficiently precise way, and the information is in all probability far from comprehensive.

### *The Effect of Pregnancy*

The question on the inquiry form was as follows:

Some evidence has been brought forward in the United States that pregnancy predisposes to poliomyelitis. This finding was not confirmed by the results of the 1947 inquiry but it seems desirable to gain further information. Brief notes should be given on individual cases of name, age, stage of pregnancy at date of onset, degree and distribution of paralysis, result as regards both mother and child.

In 1949 there were 69 cases among women pregnant at the time of onset of the disease, and altogether there were 737 cases among women of childbearing age (15–44). Of the pregnant women 14 died, and of the 668 women of childbearing age, who were not pregnant at the time of onset of the disease, 132 died. Thus the case fatality of the pregnant women was 20.3 percent, and that of the nonpregnant women, 19.8 percent. It does not seem, therefore, that pregnancy had any effect in increasing fatality. In 1947 there were 71 cases in pregnant women out of a total of 760 cases in women of childbearing age, but unfortunately information was not obtained about the number of deaths of pregnant women.

### *The Effect of Tonsillectomy*

The reference to this subject on the form was as follows:

It is generally believed that a recent tonsillectomy favors the development of the bulbar form of poliomyelitis. Brief notes should be given on any patient who had had a tonsillectomy within 2 months of admission. Clearly it is important to record cases in which the tonsillectomy had no apparent effect as well as those in which it had. Notes should give name, age, sex, degree and distribution of paralysis, and result.

Table 6. *Sixteen cases of poliomyelitis following recent tonsillectomy reported by hospitals in 1949*

| Sex | Age in years | Interval operation to onset | Type of disease | Notes |
|---|---|---|---|---|
| M | 7½ | 2 weeks | Bulbar | Died. These boys were brothers. |
| M | 4 | do | do | |
| M | 9 | 1 month | do | Died. |
| F | 6 | 14 days | do | Do. |
| M | 4 | 17 days | Bulbo-spinal | Severe peripheral paralysis. |
| F | 24 | 3 weeks | do | L. facial paralysis and slight peripheral paralysis. |
| M | 2½ | 11 days | do | Bilateral palatal and pharyngeal paralysis. Weakness arms and legs. |
| M | 7 | 3 weeks | Spinal | Good recovery. |
| M | 6 | 1 month | Bulbar | Mild case. Good recovery. |
| M | 6 | 3 weeks | Spinal | Severe paralysis. Both legs and trunk. |
| F | 2 | 1 month | do | Severe paralysis both legs. |
| F | 7 | 14 days | do | Moderate degree of paralysis. Site not stated. |
| F | 12 | 17 days | do | Moderate paralysis R. arm. |
| F | 4 | 16 days | do | Moderate paralysis L. arm. |
| F | 6 | 29 days | do | Moderate paralysis L. leg. |
| M | 10 | 2 months | No paralysis | CSF—cells 150. |

Only 16 cases were reported in which a tonsillectomy had been performed within 2 months of onset of the disease. It is clearly impossible to draw any conclusions from this small number as to whether tonsillectomy is, or is not, a predisposing cause of poliomyelitis. It seems probable that, in view of the detailed notice which this subject has received in the American literature and of the advice given in this country, the number of operations performed during the poliomyelitis epidemic had been greatly restricted.

The clinical history of these cases is, however, of interest because of the high proportion of cases with bulbar symptoms (see table 6).

### *Local Trauma and Poliomyelitis*

When the hospital survey was begun this subject had not been generally discussed in the medical papers, and it is probable that the information obtained was very incomplete, because at that time there seemed to be no reason for a special inquiry on a history of inoculation. The form of the question was as follows:

*Injections or vaccinations.* From time to time cases have been reported to the Ministry in which it seemed that an injection, usually but by no means always of a diphtheria antigen, might have something to do with the development of a localized paralysis. The cause or causes of these paralyses are unknown, and it is possible that the association is purely a chance one. Only injections given within 2 months of onset should be noted. Brief notes should be given of name, age, sex, date of injection, site and severity of paralysis.

In all, 55 cases were reported in which an injection of some kind had been given within 2 months of onset of the disease. These cases have not been analyzed in detail because the results of a parallel inquiry specially directed to this matter [3] made it clear that the information obtained from hospitals was incomplete. The special inquiry

[3] Hill, A. Bradford, and Knowelden, J.: Inoculation and poliomyelitis: A statistical investigation in England and Wales, in 1949. Brit. M. J. 2: 1–6 (1950).

was directed only to injections of antigens, but here attention may be called to the cases summarized under 1–4 in the following section because in these it seems possible that an injection or local trauma may have had some association with the onset of the disease.

*Cross Infection in Hospital*

The question asked on the form was as follows:

*Cross Infection in Hospital.* This has generally been regarded as very rare but comprehensive information would be valuable. Notes should state whether any instances of suspected cross infection have occurred in (*a*) staff or (*b*) patients. Negative as well as positive information is valuable. Information as to dates of onset and some indication of the degree of contact (e. g. same ward, next bed, etc.) should be given.

The following notes summarize the information received.

1. Two cases occurred in an orthopedic hospital to which patients convalescent from poliomyelitis were being transferred from a hospital for infectious diseases.

2. Two cases occurred in children who had been admitted to general wards of hospitals where poliomyelitis patients were also admitted.

3. One child with measles and pneumonia developed paralysis 4 weeks after admission to a hospital for infectious diseases.

4. There were seven cases among children admitted for medical and surgical treatments in general hospitals which also cared for poliomyelitis patients. Each of these seven had one or more injections of penicillin or streptomycin prior to onset of paralysis.

The incidents so far described all relate to patients. In the following instances members of the staff were apparently infected by patients.

1. At a general hospital, two nurses, who had had some, though not very close, contact with patients suffering from poliomyelitis, subsequently developed the disease.

2. In a hospital for infectious diseases a nurse, aged 23, who was working in a ward in which there was one patient with poliomyelitis, developed the disease.

3. In a general hospital two nurses, both of whom had been nursing patients with poliomyelitis, developed the disease.

4. In a general hospital a nurse, working in the poliomyelitis ward, without any prodromal illness, developed weakness of the dorsiflexors of the left foot.

5. In a hospital for infectious diseases, a young woman ward orderly, who was helping to nurse poliomyelitis patients, developed the disease.

These are instances where members of the staff may have been infected directly by patients. In addition there were two instances where a member of the staff seems to have carried infection home to a member of her family.

1. A nurse, nursing children in an orthopedic ward of a general hospital, in which there were some patients convalescent from poliomyelitis, went home for the weekend; a fortnight later, her younger sister developed the disease. The nurse's home was in a place where no other cases of poliomyelitis had occurred. This incident is noteworthy because according to the generally accepted standards, the children in the orthopedic ward should have long ceased to be infectious.

2. A part-time physiotherapist was treating patients with poliomyelitis in a hospital for infectious diseases when her daughter, aged 3½, developed the disease.

When the list of possible instances of cross infection is set out thus, it appears formidable, but it must be remembered that the survey covered many hospitals and that 5,423 cases of poliomyelitis were treated in them in 1949. It should also be remembered that it is hardly ever possible to be certain of the source of poliomyelitis infection. It is very difficult to reconcile the date of onset in some of the above instances with the generally accepted views about the period of infectivity and the incubation period. These reservations must be made before any generalizations are attempted. The survey seems to confirm the usually accepted view that cross infection is rare, but it also suggests, first, that it seems to occur more often in general hospitals than in hospitals for infectious diseases and, secondly, that children admitted for operations should be particularly closely guarded against any possiblity of infection.

Until more is known of the means whereby the infection is transmitted, it would seem prudent not to admit into a general ward any patient who, by reason of a history of contact or of doubtful signs referable to the central nervous system, might be suspected of poliomyelitis. The rigid nursing discipline adopted in cases of typhoid infection should be followed in nursing any patient in whose case there is a suspicion of poliomyelitis, particularly in the preparalytic and early paralytic phases. These are admittedly counsels of perfection, when one is dealing with a disease of which the early signs and symptoms are so often indefinite and misleading.

## Conclusions

1. The general statistics for 1949 do not differ markedly from those of 1947.

2. The proportion of patients admitted who were subsequently found to be suffering from some other disease was 30.8 percent in 1949 and 30.2 percent in 1947.

3. Judging from the experience of the years 1947 and 1949, of every 100 patients admitted to hospital with suspected poliomyelitis during

an epidemic period 5 or 6 are likely to die, 9 or 10 are likely to be severely paralyzed, 17 or 18 are likely to have a degree of paralysis which, properly treated, is not likely to prevent them from working, and the remaining 65 or 70 are likely to suffer either no ill effects or to be left with a slight degree of paralysis which may pass almost unnoticed.

4. Some support is given to the following conclusions:

(*a*) Pregnancy does not increase the risk of death from poliomyelitis.

(*b*) Bulbar lesions are more frequent in patients in whom poliomyelitis follows a recent tonsillectomy.

(*c*) Cross infection with poliomyelitis may occur in hospital wards but is least frequent in infectious diseases hospitals.

# Chronic Illness Bibliography Published

Available information on chronic illness, published in the period 1940–49, has been abstracted in a series of 545 digests in a publication recently issued by the Public Health Service. The digests are grouped in six major sections, each with several subdivisions to aid in bringing together under appropriate headings materials relating to the extent of chronic illness and measures recommended or initiated to prevent or control its severity and consequences.

In the first section, on dimensions of the problem, are references to sources revealing the extent and significance of chronic illness in the general population, among children, among persons in the working ages, and among the aged.

The second section, a compilation of data on contributory factors in chronic illness, includes information on the aging process, on genetic influences and dietary factors, on emotional, psychological, and psychosomatic aspects, and on socio-environmental factors.

The section on institutional care has five subdivisions—hospitals; convalescent homes; nursing, boarding, and foster homes; homes for the aged; and almshouses and other public institutions.

References on noninstitutional services, the fourth major section, are classified under the following headings: clinics, home care programs, home nursing, housekeeper services, and housing for the aged.

The rehabilitation section contains selected references on achievements, goals, and needs; physical and occupational therapy; and recreational and educational programs in hospitals and in communities.

The last section, on State and local approaches to the problem, includes recommendations of State and local groups that have surveyed local needs, descriptions of community organization and techniques, and data on medical care and control programs.

An index to the authors of the material digested and an index to agencies and institutions cited in the digests increase the usefulness of the publication as a reference tool. Limited numbers of copies have been distributed by the Public Health Service to State health departments and other organizations concerned with chronic illness. The publication is titled "Chronic Illness: Digest of Selected References" and is Public Health Service Publication No. 10. It was prepared by Violet B. Turner for the Division of Public Health Methods, and is on sale by the Superintendent of Documents, Government Printing Office, Washington 25, D. C., at 50 cents a copy.

# Incidence of Disease

*No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring*

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## UNITED STATES

### Reports From States for Week Ended May 19, 1951

Rocky Mountain spotted fever cases increased from 6 for the week ended May 12 to 15 for the current week. Eleven cases were reported for the same week last year. Seven of the 15 cases were reported in the South Atlantic States and 6 in the Mountain and Pacific regions. California reported the first case for 1951 from Lassen County.

Poliomyelitis cases increased slightly from 71 last week to 78 cases for the current week. For the week ended May 20, 1950, 94 cases were reported.

A case of leptospirosis was reported in San Bernardino County, California, with laboratory confirmation by animal inoculation.

#### Epidemiological Reports

*Shigellosis*

Dr. D. H. Stevens, Maine Commissioner of Health and Welfare, reports an outbreak of *Shigella* infection in a family in Lewiston. Dr. R. J. Wiseman, Jr., who made the investigation, states that the first case was discovered by chance when a 4-year-old child, who had received a head injury last fall, developed convulsions along with diarrhea. The latter was diagnosed as "intestinal flu" by the parents. Stool examination revealed an infection by *S. sonnei*. At about the same time, three other children in the family had fever and diarrhea. Two had *S. sonnei* in their stools. Other similar types of infection are believed to have been occurring in the community.

*Salmonellosis*

Dr. D. S. Fleming, Minnesota Department of Health, has reported an outbreak of *Salmonella typhimurium* infection. The suspected source of infection was raw turkey eggs used in preparing eggnog from which the organism was isolated. The eggnog was prepared by scalding a mixture of turkey egg yolks, pasteurized milk, and other ingredients in a double boiler and then allowing it to cool at room temperature. Beaten turkey egg whites were then added and allowed to stand 1 hour before refrigeration. Gin was added for "flavoring"

before serving. Ten of the 11 persons who drank the eggnog became ill with gastroenteritis 7 to 24 hours later. *S. typhimurium* was isolated from 9 of the 11 persons, including 1 who did not develop clinical symptoms.

*Trichinosis*

Dr. J. C. Hart, Connecticut Department of Health, has reported a family-group outbreak of trichinosis in Bridgeport. Home-made Italian sausage, which was prepared with ham purchased from a large packing house, was eaten by the family on April 4. Symptoms appeared 12 days later in the father, mother, two daughters, and a daughter-in-law. Nausea, diarrhea, vomiting, and swelling of the eyelids preceded the onset of muscular pains in each case.

*Gastroenteritis*

Dr. J. C. Hart has reported an outbreak of gastroenteritis which occurred recently at the University of Connecticut. Sixty-five persons who had eaten turkey and creamed turkey either at dinner on May 9 or at lunch the next day, had diarrhea, vomiting, cramps, and fever of varying degrees of severity. The incubation period varied from 5 to 24 hours. Recovery took place in 36 hours or less. The cook who prepared the turkey admits that he had diarrhea at the time he was preparing the food. Laboratory examination of food specimens is not completed.

***Comparative Data For Cases of Specified Reportable Diseases: United States***

[Numbers after diseases are International List numbers, 1948 revision]

| Disease | Total for week ended— | | 5-year median 1946–50 | Seasonal low week | Cumulative total since seasonal low week | | 5-year median 1945–46 through 1949–50 | Cumulative total for calendar year— | | 5-year median 1946–50 |
|---|---|---|---|---|---|---|---|---|---|---|
| | May 19, 1951 | May 20, 1950 | | | 1950–51 | 1949–50 | | 1951 | 1950 | |
| Anthrax (062) | 4 | 4 | 2 | (1) | (1) | (1) | (1) | 35 | 16 | 19 |
| Diphtheria (055) | 52 | 72 | 162 | 27th | 4,556 | 6,966 | 10,123 | 1,649 | 2,695 | 3,765 |
| Encephalitis, acute infectious (082) | 29 | 14 | 10 | (1) | (1) | (1) | (1) | 319 | 262 | 177 |
| Influenza (480–483) | 686 | 1,041 | 578 | 30th | 126,644 | 145,449 | 145,449 | 112,102 | 134,865 | 125,543 |
| Measles (085) | 23,837 | 15,846 | 23,635 | 35th | 370,789 | 211,299 | 428,100 | 342,088 | 192,169 | 393,154 |
| Meningitis, meningococcal (057.0) | 73 | 68 | 77 | 37th | 3,010 | 2,763 | 2,732 | 2,049 | 1.849 | 1,760 |
| Pneumonia (490–493) | 1,013 | 1,491 | (2) | (1) | (1) | (1) | (1) | [3]37,073 | 48,333 | (2) |
| Poliomyelitis, acute (080) | 78 | 94 | 94 | 11th | 560 | 645 | 536 | 1,772 | 1,776 | 937 |
| Rocky Mountain spotted fever (104) | 15 | 11 | 18 | (1) | (1) | (1) | (1) | 34 | 42 | 52 |
| Scarlet fever (050) [4] | 1,726 | 1,280 | 1,883 | 32d | 59,702 | 49,809 | 73,097 | 44,011 | 33,370 | 50,553 |
| Smallpox (084) | | | 5 | 35th | 13 | 41 | 66 | 5 | 21 | 45 |
| Tularemia (059) | 10 | 16 | 20 | (1) | (1) | (1) | (1) | 274 | 403 | 403 |
| Typhoid and paratyphoid fever (040, 041) [5] | 48 | 47 | 61 | 11th | 369 | 445 | 455 | 804 | 955 | 955 |
| Whooping cough (056) | 1,486 | 3,018 | 2,026 | 39th | 52,258 | 74,531 | 73,282 | 30,656 | 52,995 | 42,016 |

[1] Not computed.
[2] Data not available.
[3] Addition: Florida, week ended May 12, 27 cases.
[4] Including cases reported as streptococcal sore throat.
[5] Including cases reported as salmonellosis.

## Reported Cases of Selected Communicable Diseases: United States, Week Ended May 19, 1951

[Numbers under diseases are International List numbers, 1948 revision]

| Area | Diphtheria (055) | Encephalitis, infectious (082) | Influenza (480–483) | Measles (085) | Meningitis, meningococcal (057.0) | Pneumonia (490–493) | Poliomyelitis (080) |
|---|---|---|---|---|---|---|---|
| **United States** | **52** | **29** | **686** | **23,837** | **73** | **1,013** | **78** |
| **New England** | **1** | **1** | **1** | **1,072** | **3** | **31** | **2** |
| Maine | - | - | - | 19 | - | 4 | 1 |
| New Hampshire | - | - | - | 12 | - | 2 | - |
| Vermont | - | - | - | 129 | - | - | - |
| Massachusetts | 1 | 1 | - | 566 | 3 | - | 1 |
| Rhode Island | - | - | 1 | 9 | - | 1 | - |
| Connecticut | - | - | - | 337 | - | 24 | - |
| **Middle Atlantic** | **18** | **16** | **2** | **4,079** | **11** | **182** | **9** |
| New York | 4 | 15 | [1] 2 | 1,839 | 5 | 50 | 4 |
| New Jersey | 2 | - | - | 803 | 4 | 87 | 2 |
| Pennsylvania | 12 | 1 | - | 1,437 | 2 | 45 | 3 |
| **East North Central** | **2** | **4** | **14** | **4,432** | **17** | **85** | **6** |
| Ohio | 2 | - | - | 1,241 | 10 | - | - |
| Indiana | - | - | 10 | 118 | - | 6 | - |
| Illinois | - | - | 1 | 614 | 2 | 51 | 4 |
| Michigan | - | 4 | 3 | 634 | 1 | 28 | 2 |
| Wisconsin | - | - | - | 1,825 | 4 | - | - |
| **West North Central** | **2** | **1** | **22** | **1,176** | **4** | **79** | **2** |
| Minnesota | - | - | 1 | 100 | 2 | 8 | - |
| Iowa | - | - | - | 154 | - | - | - |
| Missouri | 1 | - | 3 | 368 | 1 | - | - |
| North Dakota | - | 1 | 15 | 72 | - | 59 | - |
| South Dakota | - | - | - | 3 | - | 1 | 1 |
| Nebraska | 1 | - | - | 15 | - | - | 1 |
| Kansas | - | - | 3 | 464 | 1 | 11 | - |
| **South Atlantic** | **7** | **2** | **270** | **2,121** | **16** | **74** | **17** |
| Delaware | - | - | - | 30 | - | - | - |
| Maryland | - | - | 7 | 307 | 3 | 34 | - |
| District of Columbia | - | - | - | 63 | 1 | 14 | - |
| Virginia | 2 | 1 | 228 | 837 | 6 | 8 | - |
| West Virginia | 2 | - | - | 362 | 3 | - | 2 |
| North Carolina | 2 | 1 | - | 98 | - | - | 6 |
| South Carolina | 1 | - | 10 | 31 | - | 6 | 1 |
| Georgia | - | - | 25 | 255 | 1 | 12 | 3 |
| Florida | - | - | - | 138 | 2 | - | 5 |
| **East South Central** | **7** | **2** | **43** | **532** | **8** | **54** | **2** |
| Kentucky | - | - | 8 | 143 | 3 | 15 | - |
| Tennessee | - | - | 30 | 115 | 3 | - | - |
| Alabama | 4 | 2 | - | 238 | 2 | 18 | 2 |
| Mississippi | 3 | - | 5 | 36 | - | 21 | - |
| **West South Central** | **11** | **1** | **124** | **3,495** | **4** | **329** | **19** |
| Arkansas | 3 | - | 77 | 280 | 1 | 37 | 2 |
| Louisiana | 1 | - | - | 59 | 1 | 55 | 4 |
| Oklahoma | 1 | - | 47 | 317 | 1 | 17 | 1 |
| Texas | 6 | 1 | - | 2,839 | 1 | 220 | 12 |
| **Mountain** | **2** | - | **173** | **1,131** | - | **90** | **3** |
| Montana | - | - | 23 | 79 | - | - | - |
| Idaho | - | - | - | 104 | - | - | 1 |
| Wyoming | - | - | - | 64 | - | 4 | - |
| Colorado | 1 | - | 19 | 231 | - | 25 | 2 |
| New Mexico | - | - | 3 | 188 | - | 38 | - |
| Arizona | 1 | - | 128 | 400 | - | 23 | - |
| Utah | - | - | - | 63 | - | - | - |
| Nevada | - | - | - | 2 | - | - | - |
| **Pacific** | **2** | **2** | **37** | **5,799** | **10** | **89** | **18** |
| Washington | 1 | - | 8 | 1,507 | 3 | 1 | 4 |
| Oregon | - | - | 13 | 651 | - | 29 | 1 |
| California | 1 | 2 | 16 | 3,641 | 7 | 59 | 13 |
| Alaska | - | - | 6 | - | - | - | - |
| Hawaii | 1 | - | 4 | 15 | - | 1 | - |

[1] New York City only.

*Anthrax*: Massachusetts, New York, Missouri, and California: 1 case each.

## Reported Cases of Selected Communicable Diseases: United States, Week Ended May 19, 1951—Continued

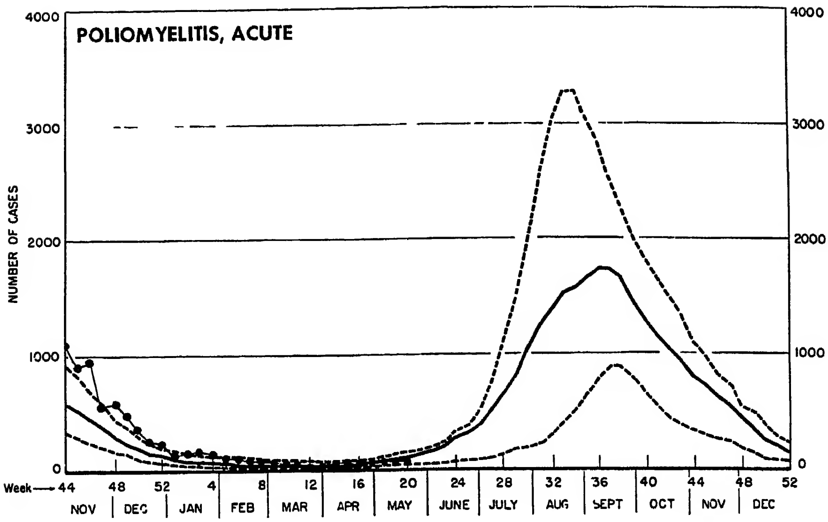
[Numbers under diseases are International List numbers, 1948 revision]

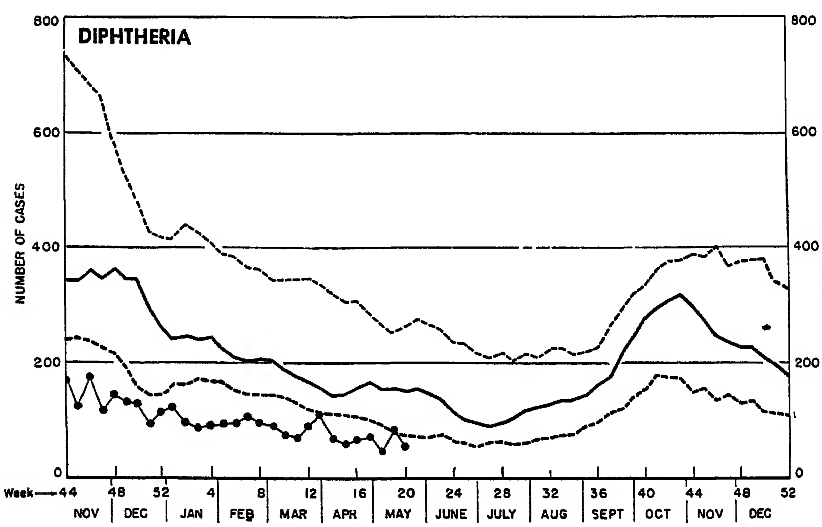
| Area | Rocky Mountain spotted fever (104) | Scarlet fever (050) | Small-pox (084) | Tularemia (059) | Typhoid and paratyphoid fever [1] (040, 041) | Whooping cough (056) | Rabies in animals |
|---|---|---|---|---|---|---|---|
| **United States** | 15 | 1,726 | | 10 | 48 | 1,456 | 142 |
| **New England** | | 172 | | | 4 | 90 | |
| Maine | | 19 | | | | 11 | |
| New Hampshire | | [2] 8 | | | | 6 | |
| Vermont | | 1 | | | | 3 | |
| Massachusetts | | 118 | | | 4 | 54 | |
| Rhode Island | | 3 | | | | 6 | |
| Connecticut | | 23 | | | | 10 | |
| **Middle Atlantic** | | 334 | | | 4 | 161 | 12 |
| New York | | [2] 178 | | | 1 | 56 | 8 |
| New Jersey | | 63 | | | 1 | 53 | |
| Pennsylvania | | 93 | | | 2 | 52 | 4 |
| **East North Central** | 1 | 579 | | | 4 | 153 | 25 |
| Ohio | | 226 | | | 3 | 25 | 2 |
| Indiana | 1 | 16 | | | | 7 | 16 |
| Illinois | | 58 | | | | 18 | 2 |
| Michigan | | 233 | | | 1 | 40 | 4 |
| Wisconsin | | 46 | | | | 63 | 1 |
| **West North Central** | | 68 | | | 2 | 68 | 28 |
| Minnesota | | 24 | | | | 4 | 1 |
| Iowa | | | | | | 32 | 24 |
| Missouri | | 19 | | | 1 | 9 | 3 |
| North Dakota | | 6 | | | | 5 | |
| South Dakota | | 8 | | | | | |
| Nebraska | | 1 | | | | | |
| Kansas | | 10 | | | 1 | 18 | |
| **South Atlantic** | 7 | 127 | | 2 | 7 | 236 | 15 |
| Delaware | | 2 | | | | 1 | |
| Maryland | 4 | 40 | | | | 6 | |
| District of Columbia | | 9 | | | | 3 | |
| Virginia | 2 | 17 | | | 1 | 63 | 3 |
| West Virginia | | 12 | | | | | 1 |
| North Carolina | 1 | 24 | | 1 | 1 | 77 | |
| South Carolina | | 4 | | | | 5 | 11 |
| Georgia | | 7 | | 1 | 2 | 35 | |
| Florida | | [2] 12 | | | 3 | 46 | |
| **East South Central** | | 33 | | | 5 | 123 | 20 |
| Kentucky | | 8 | | | | 15 | 13 |
| Tennessee | | 19 | | | 1 | 20 | 6 |
| Alabama | | 6 | | | 3 | 70 | |
| Mississippi | | | | | 1 | 18 | 1 |
| **West South Central** | 1 | 53 | | 7 | 8 | 369 | 39 |
| Arkansas | 1 | 2 | | 2 | 3 | 46 | |
| Louisiana | | 3 | | 3 | 1 | 12 | [3] 19 |
| Oklahoma | | 4 | | | | 30 | 8 |
| Texas | | 44 | | 2 | 4 | 281 | 12 |
| **Mountain** | 3 | 76 | | 1 | 6 | 205 | |
| Montana | | 9 | | 1 | | 19 | |
| Idaho | 1 | 12 | | | | 11 | |
| Wyoming | 1 | | | | | 32 | |
| Colorado | 1 | 4 | | | 1 | 34 | |
| New Mexico | | 7 | | | 2 | 47 | |
| Arizona | | 4 | | | 3 | 57 | |
| Utah | | [3] 40 | | | | 5 | |
| Nevada | | | | | | | |
| **Pacific** | 3 | 284 | | | 8 | 81 | 3 |
| Washington | | 36 | | | | 21 | |
| Oregon | 2 | 24 | | | 1 | 5 | |
| California | 1 | [2] 224 | | | 7 | 55 | 3 |
| Alaska | | | | | | | |
| Hawaii | | 6 | | | | | |

[1] Including cases reported as salmonellosis.
[2] Including cases reported as streptococcal sore throat.
[3] Report for April.
*Rabies in man:* South Carolina, 1 case.

## Communicable Disease Charts

*All reporting States, November 1950 through May 19, 1951*




The upper and lower broken lines represent the highest and lowest figures recorded for the corresponding weeks in the preceding 5 years. The solid line is a median figure for the preceding 5 years. All three lines have been smoothed by a 3-week moving average. The dots represent numbers of cases reported weekly, 1950–51.

# FOREIGN REPORTS

## NEW ZEALAND

*Reported Cases of Certain Diseases and Deaths—4 Weeks Ended Feb. 24, 1951, and 5 Weeks Ended Mar. 31, 1951*

| Disease | 4 weeks ended Feb. 24, 1951 | | 5 weeks ended Mar. 31, 1951 | |
|---|---|---|---|---|
| | Cases | Deaths | Cases | Deaths |
| Actinomycosis | --- | --- | 1 | --- |
| Brucellosis | 9 | --- | 6 | --- |
| Diphtheria | 7 | --- | 19 | --- |
| Dysentery: | | | | |
| Amebic | 4 | --- | 8 | --- |
| Bacillary | 10 | --- | 27 | 1 |
| Erysipelas | 8 | --- | 9 | --- |
| Food poisoning | 8 | --- | 30 | --- |
| Malaria | 1 | --- | --- | --- |
| Meningitis, meningococcal | 8 | --- | 9 | 1 |
| Poliomyelitis | 5 | 1 | 3 | --- |
| Puerperal fever | 3 | --- | 4 | --- |
| Scarlet fever | 58 | --- | 70 | --- |
| Tetanus | 4 | 2 | --- | --- |
| Trachoma | --- | --- | 3 | --- |
| Tuberculosis (all forms) | 123 | 28 | 164 | 46 |
| Typhoid fever | 8 | --- | 13 | 1 |

## REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

**The following reports include only items of unusual incidence or special interest and the occurrence of these diseases, except yellow fever, in localities which had not recently reported cases. All reports of yellow fever are published currently. A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.**

### Cholera

*Burma.* An increase in the number of cases of cholera was reported in Mergui for the week ended May 12, 1951, from 17 cases the previous week to 47. Decreases were noted in Bassein and Rangoon for the week ended May 12, from 65 to 35 cases and 7 to 2 cases, respectively. Moulmein reported little change from 3 to 4 cases during this period.

*India.* During the week ended May 12, 1951, 281 cases of cholera were reported in Calcutta compared with 347 for the previous week. In Madras 14 cases were reported for the week ended May 12, compared with 9 for the previous week.

### Smallpox

*Cameroon (French).* During the period April 21–30, 1951, 12 cases of smallpox were reported in French Cameroon.

*India.* The incidence of smallpox has been decreasing rapidly in some ports of India during recent weeks. For the week ended May

12, 1951, 111 cases were reported in Calcutta compared with 571 for the second week in March. Bombay and Madras reported 53 and 54 cases, respectively, for the week ended May 12. For the second week in March these ports reported 115 and 206 cases, respectively. In the ports of Masulipatnam and Visakhapatnam little change took place. Masulipatnam reported a decrease from 12 to 11 and Visakhapatnam reported an increase from 10 to 12 for this period.

*Netherlands.* Single cases of smallpox have been reported, as of May 15, 1951, in two cities located near Tilburg, namely, Breda and Vught. Another case has been reported in Sint-Michiels Gestel.

### Yellow Fever

*Brazil.* Confirmed deaths from jungle yellow fever have been reported in counties as follows. Jaraqua, February 24–March 19, four; Mineiros, February 28, one; Goias, March 9, one; Anapolis, March 11, one; Rio Verde, March 15, one; Goiania, March 18, one; and Inhumas, March 19, one.

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The printing of this publication has been approved by the Director of the Bureau of the Budget (August 10, 1949).

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It contains (1) current information regarding the incidence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

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# Public Health Reports

VOLUME 66 **JUNE 15, 1951** NUMBER 24

**IN THIS ISSUE**



U.S. PUBLIC HEALTH SERVICE 1798

FEDERAL SECURITY AGENCY

PUBLIC HEALTH SERVICE

FEDERAL SECURITY AGENCY
*Oscar R. Ewing, Administrator*

PUBLIC HEALTH SERVICE
*Leonard A. Scheele, Surgeon General*

Division of Public Health Methods
*G. St. J. Perrott, Chief of Division*

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# Public Health Reports

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## The Oral Cancer Teaching Program in Dental Schools


By Raymond F. Kaiser, M.D.*


It is generally acknowledged today that close cooperation and mutual consultation among physicians, surgeons, radiologists, and pathologists is necessary for the discovery, diagnosis, and management of every cancer case if the patient is to receive the maximum opportunity for cure. In the discovery and management of cancer of the mouth, the dentist joins this group as an indispensable partner.

The most effective way to discover cancer in an early stage is through careful periodic examinations. Because the dental profession through its public education program has been successful in motivating people to visit their dentists regularly, the dentist has an unequalled opportunity for periodic inspection of the oral cavity among his patients under the most desirable conditions. Therefore, the dentist occupies a unique position in regard to the early diagnosis of intra-oral cancer. If properly informed and trained, the dentist is in a position to find many early cases of cancer. In fact, he is able to assume an important role in case finding and preventive medicine. It is an enviable role in that he is able to mention a suspicious lesion without disturbing his patient emotionally, while at the same time, his position professionally carries authority to induce the patient to take his advice.

Another advantage possessed by a member of the dental profession is the opportunity to follow up the patient whom he has advised to seek further medical examination. This he can do by scheduling a dental appointment subsequent to the date the patient was referred for medical attention. When the dentist knows that his patient is disregarding his advice, he may find it desirable to perform a biopsy. In such a situation the dentist should be prepared to take a specimen for biopsy to send to a qualified pathologist.

Of import is the fact that the dentist himself has a significant role to play in actual cancer cases. Experience has shown that an appreciably large number of patients with intra-oral cancer, particularly


*Medical Director, Chief, Cancer Control Branch, and Chief, Training and Project Grants Section, National Cancer Institute, National Institutes of Health, Bethesda, Md.

cancer of the gingivae, consulted their dentist prior to seeking advice from their physician, thereby providing the dentist with the initial opportunity to detect and observe early cancer. Participation by the dentist is often rather extensive. Often he can contribute immeasurably to the welfare of the cancer patient through dental care before and after cancer therapy.

Finally, in no other type of cancer is prevention as possible as it is for cancers of the oral cavity. As James Ewing has stated: "The responsibility for detecting and preventing intra-oral cancer falls chiefly on the dental profession." The dentist can aid materially in the prevention of mouth cancer by searching for and correcting oral conditions, such as chronic chemical or mechanical irritations which may contribute to the causation of cancer.

Recognizing this situation and appreciating the extensive role the dental profession can play in the control of mouth cancer, the National Cancer Institute directed its attention toward enlisting the participation of the dental profession in cancer control. In 1947, at a joint meeting of the Institute and the Council on Dental Education of the American Dental Association, it was agreed that the dental profession in general would be aided if a program were initiated to integrate instruction on oral cancer, particularly early diagnosis. It was also agreed that the profession should be oriented to the specific dental aspects of the cancer problem.

It was upon these recommendations that the National Cancer Institute, with the approval of the National Advisory Cancer Council, undertook a program of grants-in-aid to dental schools for the improvement of cancer teaching. For this purpose approved dental schools were eligible to receive up to $5,000 annually. The Council specifically requested the schools to review their present teaching methods and recommended that, if an integrated course in cancer was not already given, the schools consider a program of instruction in which material in the basic sciences relative to cancer would be correlated with clinical instruction in cancer. The Council also recommended that the schools give attention to stimulating cancer research since research improves teaching and stimulates student interest.

One of the most encouraging developments in cancer education has been the growing interest and activity of the dental schools in this program. At present 38 of the 42 dental schools are participating.

In initiating the program, the National Cancer Institute recognized the fact that the most effective methods of improving cancer instruction would differ from school to school, and decided that each school should endeavor to develop the type of program which best met its particular circumstances. Assurance of continuity of funds and maximum flexibility in their use was given by the National Cancer Institute.

This degree of freedom and the lack of precedents resulted initially in some confusion in the organization of teaching programs. Arising out of this situation was the development of various kinds of programs in the schools of dentistry. In each school a member of the faculty was designated to serve as a cancer coordinator. At present, there are nine general pathologists, eight oral pathologists, seven oral surgeons, six teachers of dental medicine, two dental school deans, two clinical pathologists, two oral histologists, one oral diagnostician, and one radiologist serving as cancer coordinators. In 21 schools the coordinator has the benefit of the advice and assistance of a special cancer teaching committee, appointed during the initial period of the grants program. The committee members are representatives of the several teaching disciplines.

The schools show many similarities in their programs to improve dental education in cancer. The grant program has made it possible for all participating dental schools to strengthen their visual education materials: 38 schools have undertaken the collection of a library of color photographs and lantern slide preparations of cancer lesions; 27 schools have been able to acquire photomicrographs; 28 schools have begun the compilation of a series of histopathologic slides concerned with oral cancer and have purchased additional equipment for their pathology laboratories, such as microscopes and scopicons.

In a number of schools, teaching aids and materials of other types have been added. These consist of specimen displays in 14 schools; exhibits, in 4; moulages, in 3; and models, in 3. Purchase of these materials is indicative of the paucity of this type of teaching materials in the schools and reflects a trend to improve oral cancer teaching materials.

That the schools' interest in oral cancer teaching has increased is shown by the fact that the equivalent of 47 full-time instructors have been added to the staffs of the Nation's dental schools under this program. While serving as instructors, 8 persons are being supported in their training for graduate degrees in fields related to oral oncology.

Since effective teaching in oral cancer, as in any type of cancer instruction, is directly related to the quality of clinical material available for presentation, 28 schools have supplemented their clinical teaching by arranging for their dental students to participate in tumor clinic activities. In 28 schools, demonstration clinics have been established. Thus, an increasing number of dental students have the opportunity to observe patients with cancer in all stages of the disease and to become familiar with differential diagnosis along with the various methods of therapy. Twenty-four schools demonstrate how to take a biopsy, while in eight schools, the student takes the biopsy and follows through the processing of the specimen to the histologic slide. It is of particular interest that seven schools have established

a biopsy service for practicing dentists under the assistance of this program.

As a means of drawing together the fragments of cancer knowledge which a dental student may have acquired during his dental training, 19 schools conduct tumor conferences as a part of their teaching programs. Significant is the fact that 28 schools have added new cancer courses to their curriculum in which cancer knowledge is correlated and integrated for the student.

Since it is not desirable to separate cancer teaching entirely from that of other disease problems, additional emphasis has been placed on cancer in oral surgery by 23 schools; oral pathology by 27; oral diagnosis by 11; dental medicine by 9; general pathology by 16; roentgenology by 7; prosthetics by 6; biochemistry by 3; and periodontia by 2.

Since research is of paramount importance in effective cancer teaching, 8 schools have undertaken research activities and have established programs which provide students opportunities for investigative work. Lastly, special lectures and seminars have been utilized as a method of increasing cancer instruction in 24 schools. It is particularly noteworthy that all these schools have extended this type of instruction to practicing dentists through local dental societies.

Approximately 3 years have gone by since the initiation of this program by the National Cancer Institute. It is now possible to review its effect and enumerate a number of general accomplishments.

1. Dental educators throughout the Nation have enthusiastically responded to the program.

2. It has increased the dental student's awareness of cancer and has impressed upon him his responsibility for the early recognition of oral cancer.

3. It has aroused the interest of practicing dentists, clinicians, and teachers to the point where they are becoming increasingly aware of the importance of the oral cancer problem to the dental profession.

4. It has increased the curriculum time devoted to cancer teaching.

5. It has assisted in clarifying and defining the role of the dentist in the control of this disease.

6. It has strengthened and expanded the use of visual educational materials in dental schools.

7. It has pointed up the need for cancer instruction in postgraduate fields and has definitely furthered such teaching.

8. It has strengthened cooperative relationships between the medical and dental professions.

9. It has increased cancer facilities and services.

10. It has stimulated the initiation of several studies in clinical and fundamental oral cancer research.

11. It has stimulated and expanded research interests of dental school faculties and has created in dental students an appreciation of the value of scientific research.

12. It has strengthened teaching materials and facilities in all participating schools.

13. It has pointed out to the dentist his opportunity for a very real public health service and the significance of his contribution to cancer control.

14. Lastly, it has accomplished a general improvement in the teaching of oral cancer.

It is gratifying to report the enthusiastic response of the dental educators along with the evident progress that they have made with the limited funds provided by the National Cancer Institute. With this excellent beginning it appears reasonable to believe that the dental profession can contribute more than any other group toward bringing up the cure rate of intra-oral cancer.

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# Cancer Research Facilities Construction Grants

## Awarded Through the National Cancer Institute by the Public Health Service

By R. G. MEADER, Ph.D., and W. W. PAYNE*

One of the major forces energizing the Federal Government's attack on cancer is the construction grants program of the National Cancer Institute of the Public Health Service.

Complementing the research grants and research fellowships activities of the Institute, the program was established by the 1948 Appropriations Act and was continued by the 1949 and 1950 acts. The acts also described the program's mission: "To make grants-in-aid for research and training projects related to cancer including grants for drawing plans, erection of buildings and acquisition of land therefor."

With this the National Cancer Institute became the first of the National Institutes of Health to administer grants-in-aid for the construction of medical research facilities.

In this young program—administered by the Institute's Grants and Fellowships Branch—63 grants-in-aid totaling $16,303,000 have been awarded. Support has been given to the building of urgently needed clinical and laboratory facilities for cancer research at 47 non-Federal institutions in 27 States and the District of Columbia, most of them medical schools and affiliated hospitals. In nearly all instances Public Health Service grants have supplemented local funds.

A forest fire in Maine brought on the first—and sudden—test of the program's effectiveness. In October 1947 the fire destroyed the buildings of Bar Harbor's noted Roscoe B. Jackson Memorial Laboratory, center of mammalian genetic breeding in the United States. In addition to its own important research on genetics and other factors in the causation of cancer, the Laboratory was the source of large numbers of inbred uniform strains of mice and other animals used in medical research in laboratories throughout the United States and abroad. Cancer investigations and other research all over the country faced a slow-down or halt because of this fire.

Within 2 months after the disaster, an emergency construction grant of $250,000 was awarded by the Surgeon General to help replace

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the main laboratory at Bar Harbor. With this stimulus the Laboratory was able to obtain enough money from other sources to more than match the Public Health Service grant. By the spring of 1949 the main laboratory was completed and in use. Meanwhile, another construction grant, for $100,000, was awarded to help rebuild a second laboratory—completed in the spring of 1950.

In Los Angeles another striking structural improvement was activated by a National Cancer Institute grant. There an old two-story jail building on the County Hospital grounds was converted into a modern cancer research laboratory for the use of the University of Southern California Medical School and the College of Medical Evangelists. In this instance, the National Cancer Institute grant of $35,255 was a supplement to $52,000 of local funds.

In the new seven-story Goldblatt Memorial Hospital for Cancer Research at the University of Chicago—one of the Nation's outstanding cancer hospitals—a $690,000 grant paid for two and one-half floors of laboratories and research beds.

A $20,000 grant enabled Meharry Medical College, Nashville, Tenn., in 1948 to finish construction of a new brick-and-frame laboratory for cancer research. A second grant was made to build quarters for experimental animals used in this research.

## How it Started

Actually, the story of the cancer construction grants program began with the end of World War II. Spectacular wartime progress in research had quickened public interest in cancer and encouraged the popular hope that cancer might be conquered. The result, following World War II, was an unprecedented increase in funds for research projects and research training. Very rapidly the number of cancer studies multiplied and the supply of scientist manpower increased. However, Nation-wide expansion of cancer research was slowed by the lack of physical facilities. To remove this bottleneck to further expansion and provide laboratory space for housing new studies of cancer and utilizing the enlarged force of scientists, Congress authorized the cancer research facilities construction grants program.

## Program in Action

After the one emergency action in December 1947, 30 grants were awarded during 1948, 22 during 1949, 10 during 1950. By mid-January 1951, 18 projects had been completed, with research facilities in use. Twenty-five others were under construction. For the remainder, plans were being drawn or bids were being received.

Support was provided, in cash or contract authority, during three fiscal years: $2,303,000 in 1948, $8,000,000 in 1949, $6,000,000 in 1950.


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All the grants have been paid from appropriations of the National Cancer Institute. All have been awarded by the Surgeon General, Public Health Service, upon the recommendation of the National Advisory Cancer Council. This body, created in 1937, advises on Institute policy and recommends expenditures for grants-in-aid for cancer research.

Enlarged in October 1950 by Public Law 692 to include leaders in education and public affairs as well as scientists and medical authorities, the Council is made up of 12 appointed members and 3 ex officio members. The ex officio members are the Surgeon General of the Public Health Service and representatives from the Department of Defense and Veterans Administration.

Another important change was enacted by Public Law 692, giving the National Cancer Institute basic authority to make construction grants. Previously, authority for such grants was specified year by year in appropriation acts. However, no further funds for this purpose were included in the appropriation for fiscal year 1951.

The National Cancer Institute construction grants program does not duplicate projects supported by the Hospital Survey and Construction Act (Hill-Burton Act), Atomic Energy Commission, or National Heart Institute. The aim of the National Cancer Institute program is to provide research facilities, while the Hill-Burton program is concerned with building them for medical care and health centers. In some instances, facilities provided by the two programs may be located in the same institution or may be a part of the same project. Institute liaison with the Hospital Facilities Division of the Bureau of Medical Services, Public Health Service, assures that facilities are not duplicated and that money provided by cancer grants is not used as matching money for the Federal share under the Hill-Burton Act.

To prevent duplication of facilities by the heart and cancer construction grants programs and to assure maximum economy in the creation of facilities that could be used in common, technical supervision of both programs is provided in one office by the Research Facilities Engineer of the National Cancer Institute. Liaison with representatives of the Atomic Energy Commission provides coordination with research laboratories built by that agency.

## The Guiding Philosophy

In granting public funds for research, including construction, the Public Health Service is guided by the philosophy upon which the scientific method rests, namely, the integrity and independence of the research worker and his freedom from control, direction, regimentation, and outside interference. Only one restriction on the use of the construction grants is applied by the Public Health Service—that is, the facilities must be devoted to investigation of cancer.

The distribution of National Cancer Institute construction funds has been considered from two viewpoints. One indicated that the funds should go to a few large institutions with well-established medical research programs. The other indicated the aid should go to strengthen smaller institutions with limited research resources. Actually, the program has served both purposes. Not only have a number of existing cancer research centers been expanded, but new centers for cancer research have been created also.

Although the largest portion of the funds has gone into the improvement of laboratory facilities, encouragement has been given to the development of a balance between laboratory and clinical facilities Some institutions with good laboratory facilities have been aided in building up clinical research facilities. In a few instances funds have been given for construction of quarters for animals used in cancer research.

Grants have been made chiefly to medical schools and to hospitals closely affiliated with medical schools. In these cases personnel and facilities are available for both laboratory and clinical research, making possible a broad, well-rounded approach to research problems and facilitating the rapid transfer of laboratory discoveries into clinical evaluation and use. A few grants have gone to institutions devoted chiefly to cancer research even though they are not associated with medical schools or hospitals.

In addition, in selecting grantee institutions the Public Health Service has given preference to (1) those able to contribute a large proportion of construction costs, (2) institutions assuring a substantial share of continued support to research programs to be conducted in the facilities, and (3) institutions actively cooperating in the development of a State cancer control program.

That geographic distribution was considered is evident in the fact that all of the nine United States census regions are represented among the grantees. The census regions and total amount of NCI construction grants received by their institutions are: New England $2,131,272; Middle Atlantic $2,914,044; South Atlantic $2,250,088; East North Central $2,688,650; East South Central $715,599; West North Central $2,416,688; West South Central $425,000; Mountain $816,404; Pacific $1,945,255.

Already some heartening byproducts of the program have been reported by medical school deans. According to the Surgeon General's Committee on Medical School Grants and Finances, these construction grants have stimulated local gifts to medical schools, improved the teaching programs, and boosted the number of cancer patients being referred by general practitioners.

A complete list of cancer research construction grants follows.

*Summary of all Public Health Service cancer research construction grants awarded from inception of program through January 1951*

| Institution | Project | Date of award | Amount of grant |
|---|---|---|---|
| | *Alabama* | | |
| Medical College of Alabama and the Jefferson County Health Department, Birmingham. | *New laboratory and equipment for studies of cancer diagnostic tests. | Sept. 1948 | $47,280 |
| | *California* | | |
| University of California Medical School, San Francisco. | Facilities for laboratory and clinical research in cancer. | Mar. 1948 | 1,000,000 |
| University of California Medical School, Los Angeles. | Construction of unit for cancer research in biophysics, epidemiology, radiobiology, biochemistry. | July 1949 | 700,000 |
| Los Angeles County Hospital, Los Angeles. | *Conversion of old jail building to cancer research laboratory for College of Medical Evangelists and University of Southern California Medical School. | Mar. 1948 | 35,255 |
| University of Southern California Medical School, Los Angeles. | Facilities for cancer research in new medical center for both cancer and cardiovascular research. | Oct. 1949 | 200,000 |
| | *Colorado* | | |
| University of Colorado Medical Center, Denver. | Building for cancer research | Mar. 1948 | 400,000 |
| | *Connecticut* | | |
| Yale University School of Medicine, New Haven. | Animal laboratories for expansion of cancer research program. | do | 250,000 |
| | *District of Columbia* | | |
| Georgetown University Medical School, Washington, D. C. | *Construction and equipment for expanding cancer research laboratories, and animal facilities. | Sept. 1948 | 148,500 |
| George Washington University School of Medicine, Washington, D. C. | Facilities for cancer research in new clinical center. | Oct. 1949 | 200,000 |
| | *Modernization of laboratories for cancer research. | do | 50,000 |
| | *Georgia* | | |
| Emory University School of Medicine, Atlanta. | Construction and equipment of cancer laboratories in new research building. | June 1948 | 500,000 |
| | *Illinois* | | |
| University of Chicago School of Medicine, Chicago. | *Building of laboratory and clinical research facilities. | Mar. 1948 | 450,000 |
| | *Supplementary grant to enable completion of project above. | July 1949 | 240,000 |
| Stritch School of Medicine, Loyola University, Chicago. | Remodeling of laboratories to provide facilities for radioisotope studies. | June 1950 | 47,300 |
| | *Indiana* | | |
| Indiana University Medical Center, Indianapolis. | New building coordinating clinical and laboratory research in cancer. | do | 126,350 |
| | *Iowa* | | |
| State University of Iowa College of Medicine, Iowa City. | *Facilities for isotope studies | Feb. 1950 | 12,250 |
| | *Kansas* | | |
| University of Kansas Medical Center, Kansas City. | Facilities for cancer research in pathology, bacteriology, pharmacology. | July 1949 | 200,000 |
| | *Maine* | | |
| Jackson Memorial Laboratory, Bar Harbor, Maine. | *Rebuilding of main laboratory for genetics studies. | Dec. 1947 | 250,000 |
| | *Rebuilding of one other laboratory destroyed by 1947 fire. | Sept. 1948 | 100,000 |

*Projects completed.

*Summary of all Public Health Service cancer research construction grants awarded from inception of program through January 1951*—Continued

| Institution | Project | Date of award | Amount of grant |
|---|---|---|---|
| | *Maryland* | | |
| Johns Hopkins University Medical Center, Baltimore. | Cancer research facilities in new building adjacent to medical school and hospital. | July 1949 | $750,000 |
| | *Massachusetts* | | |
| Beth Israel Hospital, Boston | Construction of addition to animal building for cancer research. | Feb. 1950 | 50,000 |
| Boston University School of Medicine | *Enlargement and modernization of animal quarters. | Oct. 1949 | 49,900 |
| | *Supplementary grant for above project. | Feb. 1950 | 12,850 |
| Children's Medical Center, Boston | Permanent equipment for the new research building erected by Children's Cancer Research Foundation. | do | 100,000 |
| Massachusetts General Hospital, Boston. | Major facilities for cancer research, supplementing new laboratories for cardiovascular and arthritis studies. | Mar. 1948 | 700,000 |
| New England Deaconess Hospital, Boston. | Construction of 4-story cancer research laboratory. | do | 400,000 |
| | Facilities for experimental cancer detection clinic. | July 1949 | 85,000 |
| Tufts College Medical School, Boston | *Internal renovation for new laboratories and expansion of clinical research facilities in two affiliated hospitals. | Mar. 1948 | 133,522 |
| | *Michigan* | | |
| Wayne University College of Medicine and Detroit Institute of Cancer Research, Detroit. | Building and equipment of cancer research laboratory in new addition to Detroit Receiving Hospital. | Oct. 1949 | 150,000 |
| | Supplementary aid to project above | Feb. 1950 | 100,000 |
| | *Minnesota* | | |
| University of Minnesota Medical School, Minneapolis. | Major facilities for laboratory research in cancer. | Mar. 1948 | 543,550 |
| | Supplementary grant to above | Sept. 1948 | 135,888 |
| | Supplementary grant to provide clinical facilities. | July 1949 | 200,000 |
| | *Missouri* | | |
| Washington University School of Medicine, St. Louis. | Laboratory for cancer research in anatomy, biochemistry, pharmacology, physiology. | Mar. 1948 | 450,000 |
| | Clinical cancer research facilities | Sept. 1948 | 250,000 |
| St. Louis University School of Medicine, St. Louis. | Construction of cancer research institute. | July 1949 | 625,000 |
| | *New York* | | |
| Columbia University, College of Physicians and Surgeons, New York. | *Construction and equipment of cancer laboratories for research in genetics, biology, biophysics, immunology, enzyme chemistry, isotope studies, and other cancer studies. | Mar. 1948 | 1,000,000 |
| Memorial Center for Cancer and Allied Diseases, New York. | Construction of laboratory for experimental surgery. | July 1949 | 250,000 |
| N. Y. University—Bellevue Medical Center, New York. | Provision of laboratory and clinical cancer research facilities in new medical center. | Mar. 1948 | 575,000 |
| University of Rochester School of Medicine, Rochester. | *Facilities for cancer control and cancer research. | June 1948 | 434,368 |
| | *North Carolina* | | |
| Duke University School of Medicine, Durham. | Addition of cancer laboratories to research building. | Oct. 1949 | 200,000 |
| University of North Carolina School of Medicine, Chapel Hill. | Addition of cancer research laboratories to new outpatient and clinical research building. | Feb. 1950 | 200,000 |

*Projects completed.

*Summary of all Public Health Service cancer research construction grants awarded from inception of program through January 1951*—Continued

| Institution | Project | Date of award | Amount of grant |
|---|---|---|---|
| | *Ohio* | | |
| Ohio State University College of Medicine, Columbus. | Cancer laboratories in wing added to new 600-bed hospital. | Oct. 1949 | $300,000 |
| Western Reserve University School of Medicine and University Hospitals of Cleveland. | Clinical and laboratory facilities for cancer research. | do | 300,000 |
| | *Oklahoma* | | |
| Oklahoma Medical Research Foundation, Oklahoma City. | Clinical facilities for cancer studies in new research institute. | do | 125,000 |
| | *Oregon* | | |
| University of Oregon Medical School, Portland. | *Remodeled cancer research isotope laboratory. | Mar. 1948 | 10,000 |
| | *Pennsylvania* | | |
| Institute for Cancer Research, Philadelphia. | *Equipment for new cancer research institute. | do | 149,000 |
| | *Same as above | Mar. 1949 | 49,468 |
| University of Pennsylvania School of Medicine, Philadelphia. | *Improvements in and equipment for existing cancer laboratories in Department of Pathology. | Mar. 1948 | 56,208 |
| | Building and equipping part of new diagnostic clinic to house cancer research facilities. | July 1949 | 200,000 |
| University of Pittsburgh Medical School, Pittsburgh. | Clinical and laboratory facilities for cancer research. | Oct. 1949 | 200,000 |
| | *South Carolina* | | |
| Medical College of the State of South Carolina, Charleston. | *Housing for animals used in cancer research. | Sept. 1948 | 16,000 |
| | Cancer laboratories in new medical center. | Feb. 1950 | 100,000 |
| | *Tennessee* | | |
| Meharry Medical College, Nashville | *New laboratory for cancer studies | Mar. 1948 | 20,000 |
| | *Facilities for experimental animals | Mar. 1949 | 30,385 |
| University of Tennessee College of Medicine, Memphis. | 4-story building for cancer research | Mar. 1948 | 491,584 |
| Vanderbilt University School of Medicine, Nashville. | Cancer research laboratories | June 1950 | 126,350 |
| | *Texas* | | |
| University of Texas, M. D. Anderson Hospital, Houston. | Research laboratories in new cancer hospital. | June 1948 | 200,000 |
| | Supplementary to above | Oct. 1949 | 100,000 |
| | *Utah* | | |
| University of Utah Medical School, Salt Lake City. | Laboratory building for cancer research in new medical center. | Mar. 1948 | 416,400 |
| | *Virginia* | | |
| Medical College of Virginia, Richmond | *Building alterations to provide clinical research facilities. | do | 10,588 |
| University of Virginia School of Medicine, Charlottesville. | Laboratory building centralizing cancer clinics and laboratories. | do | 75,000 |
| | *Wisconsin* | | |
| University of Wisconsin Medical School, Madison. | Construction for clinical cancer research. | do | 975,000 |

*Projects completed.

# An Achievement Examination in the Subject of Cancer for Medical School Students

By HOWARD R. BIERMAN, M.D.,* and JAMES N. MCCLELLAND, Ph.D.**

An achievement examination in the subject matter of cancer has been in the process of development at the University of California School of Medicine during the past 3 years. The examination was administered to 9,358 individuals in 32 four-year medical schools in the spring of 1949. This report deals with the development of the test and the results of its administration on a Nation-wide scale.

## Development of the Test

The test was originally conceived as a device for measuring improvement in cancer instruction and student knowledge at the University of California School of Medicine, resulting from the program for bettering cancer teaching. An objective multiple-response type of measure was chosen rather than an essay test or other form of objective type test, on the basis that such a test (1) was most reliable as a before-and-after measure of student learning; (2) would obtain a comprehensive sample of student cancer learning in a short time; and (3) was most adaptable to a school-wide testing program in which the physical labor of scoring an essay test would be prohibitive.

All members of the faculty who taught any aspect of the subject matter of cancer were asked to contribute questions for the test. These questions were to test retention of cancer information, and the ability to apply this information in problems arising in typical cases, which these instructors believed should have been acquired by the student in the course of his medical school career. Other items calculated to increase the range and comprehensiveness of the test were then prepared by the staff of the Laboratory of Experimental Oncology.[1] Items were collected and grouped according to anatomical systems involved and whether the question dealt primarily with diagnosis, treatment, pathology of tumors, etiology, vital statistics, etc. The proportion of test items selected for each of the test subdivisions was determined by three factors: (1) a questionnaire directed to the chairmen of the medical school departments concerned with

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[1] A section of the National Cancer Institute at the University of California Medical School.

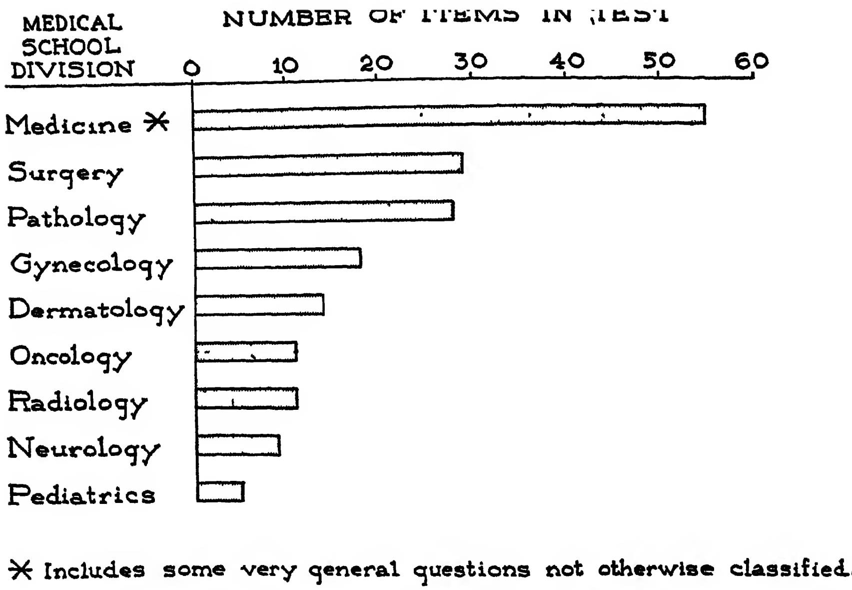


Figure 1. Number of items in the 1949 achievement examination in the subject matter of cancer, measuring achievement in various medical school subjects.

cancer instruction; (2) the number of hours of formal instruction in cancer in each department of the school; and (3) the known incidence of lesions in various physiological systems and anatomical locations.

Items were scrutinized carefully for accuracy of subject matter, ambiguities, specific determiners, and other factors which might adversely affect the validity of the test. The distribution of the 180 items according to the department of the school submitting them is shown in figure 1.

Two representative test items are given below:

1. The symptoms of pheochromocytoma can be reproduced or caused by excessive secretion of:

   *a.* Desoxycorticosterone.
   *b.* Epinephrine.
   *c.* Corticosterone.
   *d.* Posterior pituitary pressor substance.
   *e.* Renin through renal ischemia.

2. You have, in your opinion, adequately studied a man, aged 23, with abdominal pain. The characteristics of this pain are compatible with a peptic ulcer. The pain has been present over a 1-year period, and during this period the patient has lost 10 pounds in weight. The radiologist has reported to you that an ulcer is present in the first portion of the duodenum. The most important consideration to you in concluding that a benign ulcer is present, rather than a malignant one, is the:

   *a.* Age.
   *b.* Duration of the pain.
   *c.* Presence of free acid in the gastric secretion.
   *d.* Loss of only 10 pounds in weight.
   *e.* Location of the ulcer.

## The Revised Test

The test was first given to 279 students and 22 interns of the University of California School of Medicine in May 1948 (*1*). The results of this test in the local school were so promising that other schools became interested in employing it on the basis that information thus obtained might be helpful in assisting a school's efforts to improve its instruction. Consequently, a circular letter concerning the interest of their schools in participating in such a program was addressed to the cancer coordinators in all the schools which were recipients of the National Cancer Institute grants for improving cancer teaching. Schools were assured that results from participating institutions would be kept confidential. The response was much greater than had been anticipated, and accordingly, in consultation with, and with the financial support of, the National Cancer Institute, a special project for carrying out the projected testing program was created.

In preparation for the larger project of administering the test on a Nation-wide scale, the test was revised considerably because several of the original items were primarily of local interest and thus were inappropriate for other schools. Furthermore, as is inevitable with the first administration of a test, some of the items did not contribute appreciably to the range of scores on the test, were poor discriminators between those who knew the subject well and those who did not (on the basis of total test scores), or contained distracters (words of more than a single meaning), etc. New items were sought from many experts in the field to make the test more comprehensive of cancer knowledge and to replace items judged inappropriate in the original test.

As finally constituted, the revised form of the test contained 180 five-choice multiple-response items—109 were identical to items in the pilot test, and the remaining 71 varied from minor changes of a word or two to completely new items. Items ranged greatly in difficulty from those easy for the average medical school freshman to those too difficult for most senior students.

Every effort was made to sample the whole field of cancer (table 1) and to keep the test free from controversy, a very difficult task in an area in which so little can be stated unequivocally. The student was permitted 1 hour and 55 minutes for answering the questions, or approximately 40 seconds per item. This is a rate somewhat slower than customary for items of this type, but because of the technical terminology and because of the original testing experience, the total test time was left unchanged, thereby making the examination a power rather than a speed test. Students were instructed to answer all questions as it was felt this procedure would aid in standardizing the administration and scoring of the test.


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Table 1. *Cross-index of distribution of items of achievement test, 1949 edition*

| Questions involving primarily | Physiological system or anatomical site (number of items) | | | | | |
|---|---|---|---|---|---|---|
| | Respiratory | Digestive | Male genitourinary | Female genitourinary and breast | Nervous | Hematopoietic |
| Diagnosis | 7 | 22 | 8 | 10 | 6 | 5 |
| Treatment | 2 | 5 | 5 | 5 | | 3 |
| Pathology | 4 | 9 | 3 | 14 | 3 | 2 |
| Etiology | | | | 2 | | 1 |
| Total | 13 | 36 | 16 | 31 | 9 | 11 |
| Percent of total test | 7 | 21 | 9 | 17 | 5 | 6 |

| Questions involving primarily | Bone | Skin | Soft tissue | Endocrine | Experimental | Miscellaneous |
|---|---|---|---|---|---|---|
| Diagnosis | 3 | 6 | 1 | 3 | | 1 |
| Treatment | 1 | 6 | 1 | 1 | | 3 |
| Pathology | 2 | 7 | 3 | 8 | | 5 |
| Etiology | | 3 | 1 | | 7 | 2 |
| Total | 6 | 22 | 6 | 12 | 7 | 11 |
| Percent of total test | 3 | 12 | 3 | 7 | 4 | 6 |

The examination was administered to 9,358 individuals in 32 four-year medical schools in the United States during a 1-month period in April and May of 1949 (table 2). The schools in the program were distributed geographically in such a manner as to form a representative cross section of all the schools in the country.

It will be noted that the minimum number of students tested at any of the four academic levels was 1,810. Of the 364 examinees listed under the miscellaneous column, 39 were premedical school students and most of the remainder were interns, residents, and faculty members.

## Test Results

Norms for the test were established on the basis of the total number of students taking the test, omitting the students at the University of California School of Medicine where the test was prepared originally, and certain other student groups which did not conform with the usual procedure of promoting students from one class to another in June of each year (table 3). These latter students were omitted because their achievement was not directly comparable with the achievement of students in the more conventional curricula.

Scores overlapped considerably between adjacent student groups. However, differences between the means of adjacent groups were significant beyond the 1 percent level in all instances.[2] Coefficients

[2] At the 1 percent level there is only one chance in 100 that a difference as large or larger than that obtained could have arisen by chance if there were no difference between the groups tested.

Table 2. *Number of individuals taking the 1949 achievement examination in the subject matter of cancer*

| College* | Freshman | Sophomore | Junior | Senior | Miscellaneous |
|---|---|---|---|---|---|
| Albany Medical College | 48 | 45 | 48 | 37 | 11 |
| University of California School of Medicine | 70 | 67 | 72 | 65 | 67 |
| University of Chicago Medical School | 68 | 60 | 41 | — | 4 |
| College of Medical Evangelists | 95 | 77 | 74 | 54 | 2 |
| Creighton University School of Medicine | 76 | 70 | 63 | 39 | 1 |
| Duke University School of Medicine | 75 | 69 | 19 | 49 | — |
| Emory University School of Medicine | 66 | 62 | 53 | 33 | 1 |
| Georgetown University School of Medicine | 113 | 104 | 77 | 55 | 10 |
| University of Georgia School of Medicine | 81 | 79 | 80 | 63 | 4 |
| Howard University College of Medicine | 69 | 66 | 60 | 48 | 1 |
| University of Kansas School of Medicine | 76 | 73 | 58 | 57 | 28 |
| Louisiana State University School of Medicine | 97 | 86 | 71 | 54 | 3 |
| Marquette University School of Medicine | 92 | 90 | 79 | 39 | 7 |
| University of Michigan Medical School | 138 | 112 | 93 | 106 | 19 |
| University of Minnesota Medical School | 109 | 108 | 87 | 81 | 18 |
| University of Nebraska College of Medicine | 85 | 80 | 71 | 41 | 31 |
| New York Medical College | 120 | 122 | 98 | 95 | 35 |
| New York University College of Medicine | — | — | 104 | 38 | — |
| Ohio State University College of Medicine | 80 | 75 | 64 | 49 | 1 |
| University of Oklahoma School of Medicine | 59 | 60 | 73 | 51 | 7 |
| University of Oregon Medical School | 70 | 71 | 56 | 59 | 1 |
| Southwestern Medical College | 63 | 58 | 58 | 54 | — |
| Syracuse University College of Medicine | 51 | 49 | 37 | 43 | 9 |
| Temple University School of Medicine | 134 | 121 | 104 | 93 | 1 |
| University of Tennessee College of Medicine | 106 | 97 | 99 | 109 | 10 |
| Tulane University of Louisiana School of Medicine | 114 | 131 | 110 | 110 | 4 |
| University of Utah College of Medicine | — | 47 | 47 | 35 | 39 |
| Medical College of Virginia | 77 | 74 | 94 | 57 | 22 |
| University of Virginia Department of Medicine | 72 | 67 | 60 | 55 | 14 |
| University of Washington School of Medicine | 41 | 46 | 42 | — | 4 |
| George Washington University School of Medicine | 85 | 80 | 75 | 68 | 5 |
| Western Reserve University School of Medicine | 81 | 77 | 83 | 73 | 5 |
| Total | 2,511 | 2,423 | 2,250 | 1,810 | 364 |

*Alphabetical listing.

of reliability were obtained by the split half method (*2*), using odd and even numbered items to form the two halves, with representative samples of 400 students drawn from each of the freshman, sophomore, junior, and senior groups (table 4). In view of the relative homogeneity of the groups tested, the reliability coefficients were satisfactorily high and the over-all reliability of 0.94 indicates a very high degree of consistency among the test items.

The validity of the test, that is, the extent to which it really does measure student knowledge of the subject matter of cancer, cannot be assessed easily since there is no comparable measure of cancer knowledge which can be used as a criterion. The test has been read by many experts in the field of oncology, including most of the cancer coordinators in the schools where the test was given. Although there were occasional adverse criticisms of individual items, it was the general consensus that the test as a whole appeared to be adequately comprehensive and that it should measure student knowledge of cancer with a high degree of accuracy. Validation based on opinions such as these, while not absolute, is highly encouraging.

Table 3. *1949 cancer test norms for students from 4-year medical schools*

| Class | Number of students | Average score [1] | Standard deviation |
|---|---|---|---|
| Freshman | 2,335 | 50.98 | 9.04 |
| Sophomore | 2,212 | 80.39 | 13.85 |
| Junior | 2,068 | 98.24 | 14.56 |
| Senior | 1,636 | 107.37 | 14.53 |

[1] 180 possible. Uncorrected for guessing.

Table 4. *Corrected coefficients of reliability for the 1949 cancer test, based on scores of 400 students from each academic level* [1]

| | Freshman | Sophomore | Junior | Senior | All groups combined |
|---|---|---|---|---|---|
| Coefficient of reliability | 0.64 | 0.81 | 0.84 | 0.84 | 0.94 |
| Standard error of reliability coefficient | .03 | .02 | .02 | .02 | .01 |

[1] Reliability coefficients were corrected by the Spearman-Brown prophecy formula.

Norms for the test have been plotted, together with zones within which lie 50 percent and 90 percent of the average scores of all the classes (fig. 2). Plots have also been made of the average scores of students in all schools giving the test (figs. 3–6). There is no indication of significant differences between schools on a geographical basis, and the groupings depicted are for purposes of convenience only. It will be noted from these figures that there are wide differences in scores from school to school, and these differences tend to increase with each succeeding class year as each class receives more education in oncology. The greatest increases in score appear generally to occur during the sophomore year. Most schools tend to maintain their same relative positions in comparison to other schools participating from one student year level to another, although there are a few notable exceptions.

The subject matter of the test was analyzed item by item, since various trial groupings of items seemed to yield no factors with any great degree of independence. A separate report made to each school showed the percent of students in each academic year answering each item correctly and also how this percent compared with the percent answering correctly at other year levels and in other schools. The report was made in the form of tables. The items were grouped according to the department of the school considered most responsible for teaching the information tested, with brief, general descriptions of the subject matter of the items. Table 5 is a copy of part of one page of one of these reports.

In the tables the relative performance of the particular class was shown by one of three symbols, *H*, *M*, or *L*, which have the following meanings:

*H:* Indicates that the percent of students in this class answering

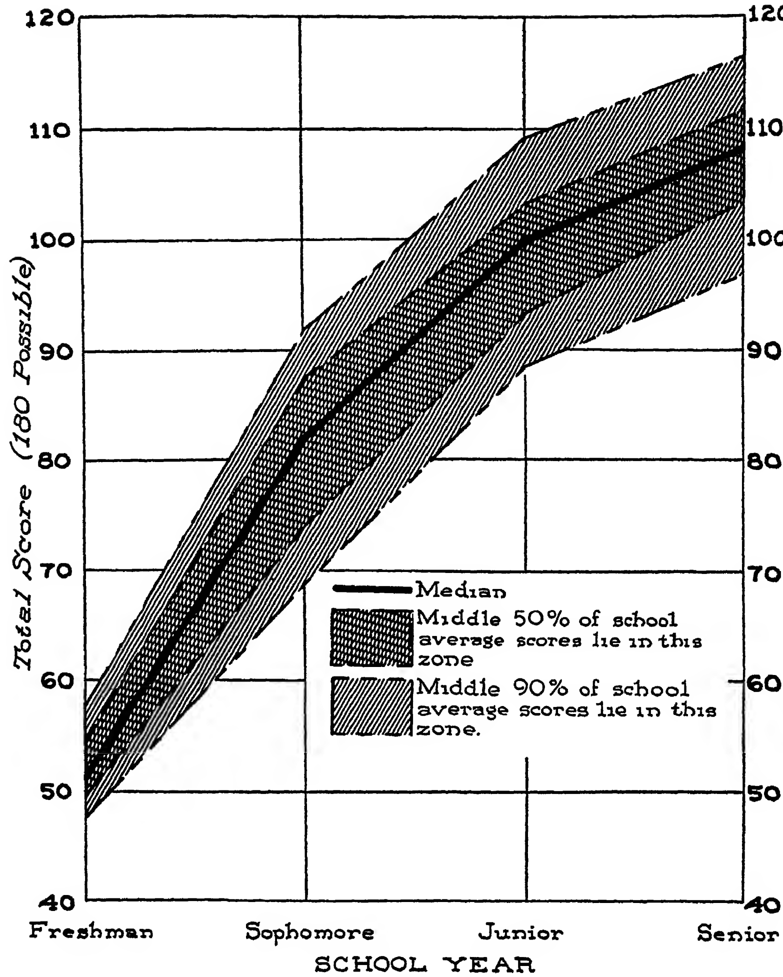


**Figure 2. Distribution of average scores on 1949 cancer examination for all schools participating, by classes. Note increasing range of scores and decreasing yearly gains at the upper academic levels.**

this item correctly placed the class in the *highest* 20 percent of all classes at that academic level. Presumably, students in this class knew more about the subject tested by this item than did students at the same academic level in 80 percent of the schools enlisted in the program.

*M:* Indicates that the percent of students in this class answering the questions correctly placed the class in the *middle* 60 percent of all classes at that academic level.

*L:* Indicates that the percent of students in this class answering the questions correctly placed the class in the *lowest* 20 percent of all classes at that academic level.

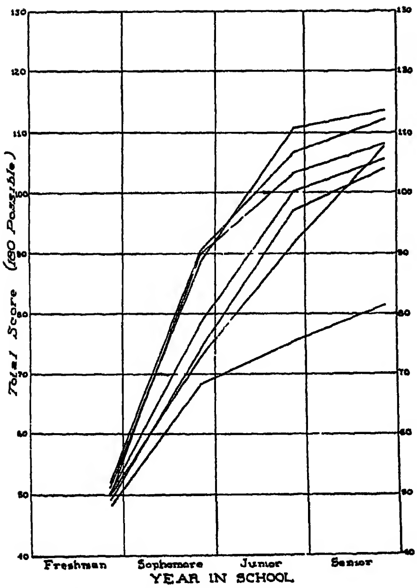


Figure 3. Average scores on 1949 cancer examination for students in seven Eastern medical schools.

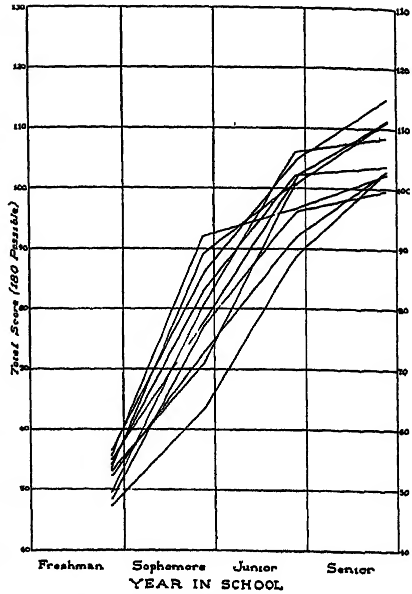


Figure 4. Average scores on 1949 cancer examination for students in 10 Midwestern medical schools.

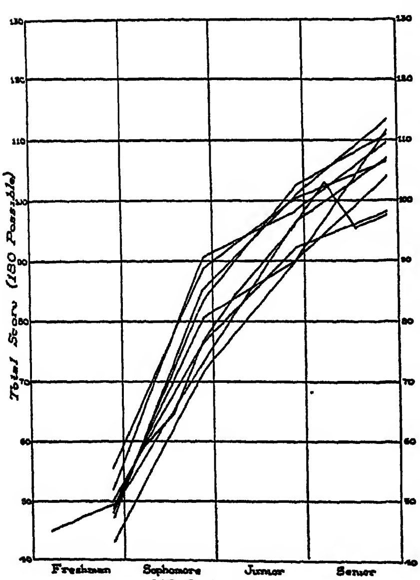


Figure 5. Average scores on 1949 cancer examination for students in nine Southern medical schools.

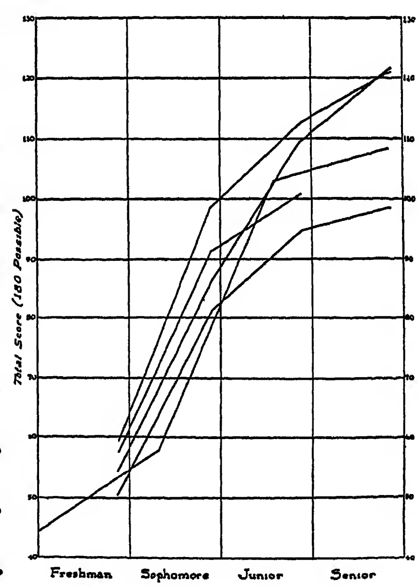


Figure 6. Average scores on 1949 cancer examination for students in five Western medical schools.

Table 5. *Example of methods for reporting results of 1949 cancer achievement test, item by item*

GYNECOLOGY

| Item | Cancer topic | Percent score and standing | | | |
|---|---|---|---|---|---|
| | | Freshman | Sophmore | Junior | Senior |
| 12 | Precancerous lesions of genitourinary tract | 36 H | 84 M | 93 H | 100 H |
| 17 | Physiology of gynecological tumors | 66 M | 94 H | 97 H | 95 H |
| 55 | Symptomatology of gynecological tumors | 11 L | 54 H | 86 H | 62 H |
| 63 | Etiology of gynecological cancer | 65 H | 70 M | 74 L | 92 M |
| 95 | Characteristics of gynecological tumors | 10 L | 28 M | 44 M | 63 H |

For example, for an item described thus:

| *Item* | *School Y* | *Freshman* | *Sophomore* | *Junior* | *Senior* |
|---|---|---|---|---|---|
| 49 | Symptomatology of intracranial tumors | 34 H | 45 M | 58 M | 75 M |

the interpretation would be as follows:

Although more of the students at the higher academic levels (junior and senior) seem to know the answer to this question than do the lower classmen, the increase in score from one level to another is not as great as in most schools. Hence, even though the 34 percent of freshmen answering the item correctly places this group among the *highest* 20 percent of all freshmen classes, the 75 percent of the seniors answering the item correctly is sufficient only to put that group in the *middle* 60 percent of all senior groups taking the test. It should not be overlooked that even though a score may have an *H* rating, this does not indicate that learning of the material tested has been satisfactory. It only indicates that learning is relatively high in the group to which the rating is given compared with other student groups at the same level.

In the tables, the item numbers correspond to the item numbers of the test, but the description accompanying the item numbers relate to the subject areas and not the items themselves. This procedure was adopted so that any influence the report might have on instruction would be on a broader, more comprehensive basis than might result if each test item were described exactly, and also to preserve the individual test item for use in future editions of the test.

Complete reporting of the results of the program is not feasible, but a few senior student scores on some of the test items are interesting. For example:

1. Seventy-four percent of the seniors believed that only about 5 percent of patients with untreated carcinoma of the breast survive 5 years.

2. Sixty-four percent of the seniors did not know that monocytic leukemia is rapidly fatal. Twenty-seven percent did not know that it produces splenomegaly.

3. Fifty-one percent of the seniors did not recognize the sudden appearance of Jacksonian convulsions in an adult as suggestive of the possible presence of new growth in the brain.

4. Thirty percent of the seniors checked leukorrhea instead of metrorrhagia as the most frequent symptom of carcinoma of the cervix.

5. Sixty-four percent of the seniors did not know in which location of the stomach carcinoma would offer the best prognosis.

6. Seventy-six percent of the seniors did not recognize enlargement of the breasts in the male as a symptom of carcinoma of the testis.

7. Fifty-eight percent of the seniors did not check vomiting as a frequent first manifestation of tumors of the central nervous system in children.

8. Sixty-two percent of the seniors did not know that xeroderma pigmentosum is a precancerous lesion.

It is appropriate to emphasize that these results were obtained from students about to graduate. It is clear that many students are graduating today lacking important knowledge which they should have concerning the diagnosis and treatment of cancer.

## Continuation of the Program

Cancer coordinators and other interested faculty members in schools where the test was given in 1949 have found the results very useful in planning their cancer teaching program. Although implications of the testing program are many, the test will not have accomplished entirely the purpose for which it was intended until it can be readministered several times in each school to measure possible changes in cancer learning that should take place as a result of the increased emphasis now being placed on cancer in medical schools throughout the country.

Therefore, present plans call for the test to be readministered in all cooperating schools each year for 5 years. By that time it should be possible to determine to some extent the relative effectiveness of the numerous instructional methods now being tried out and to gain considerable insight into the general effectiveness of medical educational programs.

### REFERENCES

(*1*) Bierman, Howard R., and McClelland, James N.: A study of methods for the improvement of cancer learning in the medical school; first annual report. J. Assoc. Am. Med. Coll. **24**: 351–362 (1949).

(*2*) Tiegs, Ernest W.: Tests and Measurements in the Improvement of Learning. Boston, Houghton Mifflin Co., 1939, pp. 384 and 490.

# Industrial Sickness Absenteeism Third and Fourth Quarters, 1950

By W. M. Gafafer, D.Sc.*

The accompanying data on 8-day or longer disabilities experienced by male employees during the third and fourth quarters of 1950 are derived from periodic reports submitted by industrial sick benefit associations, company relief departments, and group health insurance

Table 1. *Number of absences per 1,000 males (annual basis) on account of sickness and nonindustrial injuries disabling for 8 consecutive calendar days or longer, by cause; experience of male employees in various industries, third and fourth quarters of 1950* [1]

| Cause [2] | Number of absences per 1,000 males (annual basis) beginning in specified period | | | | | | |
|---|---|---|---|---|---|---|---|
| | Fourth quarter | | Third quarter | | Year | | |
| | 1950 | 1949 | 1950 | 1949 | 1950 | 1949 | 1945–49 |
| Sickness and nonindustrial injuries | 102.3 | 84.4 | 94.6 | 80.3 | 112.4 | 94.0 | 113.8 |
| Nonindustrial injuries (169–195) | 13.4 | 10.6 | 13.6 | 11.4 | 13.4 | 11.0 | 12.2 |
| Sickness | 88.9 | 73.8 | 81.0 | 68.9 | 99.0 | 83.0 | 101.6 |
| Respiratory diseases | 27.1 | 23.7 | 18.5 | 15.4 | 33.4 | 26.2 | 38.0 |
| Tuberculosis of respiratory system (13) | .3 | .8 | .6 | .5 | .5 | .7 | .7 |
| Influenza, grippe (33) | 7.1 | 6.5 | 4.0 | 2.7 | 10.7 | 7.6 | 13.8 |
| Bronchitis, acute and chronic (106) | 6.0 | 4.0 | 3.2 | 2.7 | 5.9 | 4.3 | 6.3 |
| Pneumonia, all forms (107–109) | 4.3 | 4.0 | 3.2 | 2.5 | 5.2 | 4.0 | 4.2 |
| Diseases of pharynx and tonsils (115b, 115c) | 2.9 | 2.1 | 2.5 | 2.6 | 3.1 | 3.3 | 4.2 |
| Other respiratory diseases (104, 105, 110–114) | 6.5 | 6.3 | 5.0 | 4.4 | 8.0 | 6.3 | 8.8 |
| Digestive diseases | 17.9 | 14.9 | 19.0 | 15.6 | 19.0 | 16.6 | 17.4 |
| Diseases of stomach except cancer (117, 118) | 5.9 | 5.3 | 5.9 | 4.5 | 5.8 | 5.2 | 5.8 |
| Diarrhea and enteritis (120) | 2.2 | 1.5 | 2.4 | 2.2 | 2.5 | 2.0 | 2.2 |
| Appendicitis (121) | 4.0* | 2.7 | 4.7 | 3.5 | 4.1 | 3.5 | 3.5 |
| Hernia (122a) | 2.2 | 2.5 | 2.5 | 2.8 | 2.7 | 2.7 | 2.5 |
| Other digestive diseases (115a, 115d, 116, 122b–129) | 3.6 | 2.9 | 3.5 | 2.6 | 3.9 | 3.2 | 3.4 |
| Nonrespiratory-nondigestive diseases | 40.2 | 32.4 | 40.1 | 35.7 | 42.9 | 37.7 | 42.4 |
| Infectious and parasitic diseases (1–12, 14–24, 26–29, 31, 32, 34–44) [3] | 2.1 | 1.5 | 2.0 | 1.7 | 2.8 | 2.3 | 2.7 |
| Rheumatism, acute and chronic (58, 59) | 2.9 | 3.1 | 3.1 | 3.3 | 3.4 | 3.8 | 4.7 |
| Neurasthenia and the like (part of 84d) | 1.3 | 1.3 | 1.4 | 1.1 | 1.4 | 1.5 | 1.9 |
| Neuralgia, neuritis, sciatica (87b) | 2.0 | 1.6 | 1.9 | 2.0 | 2.0 | 2.0 | 2.8 |
| Other diseases of nervous system (80–85, 87, except part of 84d, and 87b) | 1.9 | 1.8 | 1.9 | 1.8 | 2.2 | 1.8 | 1.9 |
| Diseases of heart and arteries, and nephritis (90–99, 102, 130–132) | 7.3 | 6.2 | 6.5 | 6.3 | 7.7 | 6.8 | 7.2 |
| Other diseases of genitourinary system (133–138) | 3.7 | 3.2 | 4.1 | 3.2 | 4.1 | 3.2 | 3.2 |
| Diseases of skin (151–153) | 3.9 | 2.4 | 4.0 | 3.2 | 3.5 | 2.9 | 3.5 |
| Diseases of organs of movement except diseases of joints (156b) | 2.8 | 1.9 | 2.9 | 2.2 | 3.0 | 2.4 | 3.1 |
| All other diseases (45–57, 60–79, 88, 89, 100, 101, 103, 154, 155, 156a, 157, 162) | 12.3 | 9.4 | 12.3 | 10.9 | 12.8 | 11.0 | 11.4 |
| Ill-defined and unknown causes (200) | 3.7 | 2.8 | 3.4 | 2.2 | 3.7 | 2.5 | 3.8 |
| Average number of males | 161,415 | 187,473 | 167,804 | 193,068 | 161,173 | 195,290 | 1,000,183 |

[1] Industrial injuries and venereal diseases are not included.
[2] Numbers in parentheses are disease title numbers from International List of Causes of Death, 1939.
[3] Exclusive of influenza and grippe, respiratory tuberculosis, and venereal diseases.

*From Division of Industrial Hygiene, Public Health Service. The report for the first and second quarters of 1950, and for the year 1949 appeared in Pub. Health Rep. 65: 1556–1561 (1950); reprint No. 3059.

plans. These reports covered approximately 170,000 male workers in various industries.

The third and fourth quarter rates for 1950 are generally above the corresponding rates for 1949; thus, the rates for sickness and nonindustrial injuries show an increase of about 20 percent for each of the two quarters. Similar increases are noted for the digestive group of diseases.

The third and fourth quarter rates for sickness and nonindustrial injuries during the past 10 years increased to a high in 1945 of 120.1 and 157.6 per thousand, respectively, and then decreased during the period 1945–49. The rates for 1950 are thus introducing what might well become the beginning of an upward trend, a phenomenon that would be in harmony with past experiences which have yielded higher sickness rates in the presence of increased industrial activity.

# Incidence of Disease

*No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring*

## UNITED STATES

### Reports From States for Week Ended May 26, 1951

Poliomyelitis cases increased slightly in the current week to 88 compared with 78 for the previous week. Of the 88 cases reported, 15 occurred in Texas, 14 in California, 7 in Arizona, and 5 in West Virginia. No other State had more than 5. For the same week in 1950, 102 cases were reported—39 in Texas, 9 in California, 7 in New York, 6 in Iowa, and 5 in Arizona. Since March 15, which is about the low point in poliomyelitis incidence, 648 cases have been reported as compared with 747 for the same period in 1950.

Of the total 13 cases of Rocky Mountain spotted fever reported for the current week, 8 occurred in the South Atlantic States and 2 in the Mountain and Pacific States. Of 18 cases which have been reported in the South Atlantic States since April 21, 6 were in Maryland, 7 in Virginia, and 4 in North Carolina. A large majority of the cases reported in this area are reported from these 3 States.

### Epidemiological Reports

*Infectious Hepatitis*

Dr. C. R. Freeble, Jr., Ohio Department of Health, reports an outbreak of infectious hepatitis in Green County. The first case, which gave a history of a previous attack, occurred late in March. Thirty recognized cases followed in children in grades 1 through 5 of the local school. Secondary cases occurred in five homes. Upper respiratory manifestations preceded the onset of jaundice in many instances. Other symptoms noted were headache, loss of appetite, nausea and vomiting, abdominal pain, and, occasionally, diarrhea. Dr. G. E. Savage, local health commissioner, who made the investigation, reported that other children had digestive disturbances during the outbreak but did not develop jaundice. Sixty-eight cases of hepatitis were reported for the entire State for the week ended May 26.

Dr. L. E. Burney, Indiana Health Commissioner, reports that an outbreak of infectious hepatitis has occurred in Indiana, principally in the northern tier of counties. Cases have also been reported generally over the State. A total of 65 cases has been reported.

*Trachoma*

Dr. W. L. Halverson, California Director of Health, has reported that several cases of trachoma were found among Indians living on one rancheria. An investigation by an ophthalmologist revealed that among the 25 Indians, 9 had active infections, 8 showed evidence of old inactive infections, and the remaining 7 had no evidence of disease.

*Diphtheria*

Dr. W. L. Halverson reports five cases of diphtheria in Humboldt County, three of which occurred in the city of Eureka. All had onset between May 9 and 22, inclusive. Only one of the five cases was in a child. In this same area, 10 cases with 2 deaths were reported in January and February 1951.

*Gastroenteritis*

Dr. R. M. Albrecht, New York State Department of Health, reports that the investigation of an outbreak of food poisoning among persons who ate a turkey dinner at a snack bar in Suffolk County reveals presumptive evidence of canned peas being the vehicle. Only those who ate the peas became ill.

*Rubella*

Dr. L. E. Burney, Indiana Health Commissioner, reports that during the interval April 1 to May 23 a total of 479 cases of rubella was reported in the State, 235 of this number being accounted for by one county.

*Influenza*

The Influenza Information Center, National Institutes of Health, reports that seven paired serum specimens tested by Dr. Morris Schaeffer, Director of the Regional Laboratory at Montgomery, Alabama, showed significant rises in titer against influenza virus as follows: one against influenza virus A (PR–8) and one against A-prime (FM–1) received from North Carolina; and two against influenza virus A (PR–8), two against A-prime (FM–1), and one against influenza virus B (Lee) received from Oklahoma.

The World Health Organization reports that the strain of virus isolated during the April epidemic in the Netherlands apparently belongs to type B and not to type A as had been announced previously.

*Diseases of Unknown Etiology*

Dr. R. O. Saxvik, North Dakota Health Officer, reports that for the past several weeks the Red River Valley area in North Dakota has experienced an outbreak of a bizarre disease, the diagnosis of which has not been established. In and around Fargo, 20 cases have been reported which are characterized as follows: The onset was usually sudden and febrile, with temperatures ranging up to 104°.

It has been associated with very severe headache and considerable disability and stiffness of the neck. Spinal fluid findings have been entirely negative and signs of peripheral nervous system involvement have been absent. The disease has lasted 4 to 5 days and has disappeared without sequelae. Although 20 cases have occurred, many others, mostly mild, have been suspected in the Red River Valley. Blood and spinal fluid specimens have been sent to the Public Health Service Rocky Mountain Laboratory and to the North Dakota State Health Department Laboratory for further study.

*Comparative Data For Cases of Specified Reportable Diseases: United States*

[Numbers after diseases are International List numbers, 1948 revision]

| Disease | Total for week ended— | | 5-year median, 1946–50 | Seasonal low week | Cumulative total since seasonal low week | | 5-year median, 1945–46 through 1949–50 | Cumulative total for calendar year— | | 5-year median, 1946–50 |
|---|---|---|---|---|---|---|---|---|---|---|
| | May 26, 1951 | May 27, 1950 | | | 1950–51 | 1949–50 | | 1951 | 1950 | |
| Anthrax (062) | 1 | 2 | 2 | (1) | (1) | (1) | (1) | 30 | 18 | 21 |
| Diphtheria (055) | 56 | 67 | 151 | 27th | 4,612 | 7,033 | 10,274 | 1,705 | 2,762 | 3,916 |
| Encephalitis, acute infectious (082) | 31 | 12 | 11 | (1) | (1) | (1) | (1) | 350 | 274 | 186 |
| Influenza (480–483) | 575 | 589 | 498 | 30th | 127,219 | 146,038 | 146,038 | 112,677 | 135,454 | 126,001 |
| Measles (085) | 22,285 | 15,067 | 19,834 | 35th | 393,074 | 226,365 | 454,509 | 364,373 | 207,237 | 419,563 |
| Meningitis, meningococcal (057.0) | 64 | 62 | 62 | 37th | 3,074 | 2,825 | 2,799 | 2,113 | 1,911 | 1,827 |
| Pneumonia (490–493) | 824 | 1,236 | (2) | (1) | (1) | (1) | (1) | [3]38,040 | 49,569 | (2) |
| Poliomyelitis, acute (080) | 88 | 102 | 102 | 11th | 648 | 747 | 704 | 1,860 | 1,878 | 1,077 |
| Rocky Mountain spotted fever (104) | 13 | 11 | 13 | (1) | (1) | (1) | (1) | 47 | 52 | 65 |
| Scarlet fever (050)[4] | 1,667 | 1,139 | 1,781 | 32d | 61,369 | 50,948 | 74,434 | 45,078 | 34,509 | 51,890 |
| Smallpox (084) | ------- | ------- | 4 | 35th | 13 | 41 | 66 | 5 | 21 | 45 |
| Tularemia (059) | 17 | 18 | 20 | (1) | (1) | (1) | (1) | 291 | 421 | 421 |
| Typhoid and paratyphoid fever (040, 041)[5] | 49 | 75 | 75 | 11th | 418 | 520 | 539 | 853 | 1,030 | 1,030 |
| Whooping cough (056) | 1,545 | 2,852 | 1,914 | 39th | [6]53,883 | 77,383 | 74,737 | [6]32,281 | 55,847 | 43,471 |

[1] Not computed.
[2] Data not available.
[3] Additions: Week ended May 12—Tennessee, 56 cases; week ended May 19—Virginia, 60, West Virginia, 27, and Florida, 6.
[4] Including cases reported as streptococcal sore throat.
[5] Including cases reported as salmonellosis.
[6] Addition: West Virginia, week ended May 19, 80 cases.

NOTE.—Maine, week ended Apr. 7, change in diagnosis of 1 case typhoid fever to paratyphoid B.

## Reported Cases of Selected Communicable Diseases: United States, Week Ended May 26, 1951

[Numbers under diseases are International List numbers, 1948 revision]

| Area | Diphtheria (055) | Encephalitis, infectious (082) | Influenza (480–483) | Measles (085) | Meningitis, meningococcal (057.0) | Pneumonia (490–493) | Poliomyelitis (080) |
|---|---|---|---|---|---|---|---|
| **United States** | **56** | **31** | **575** | **22,285** | **64** | **824** | **88** |
| **New England** | **5** | | **15** | **1,105** | **5** | **34** | |
| Maine | | | 14 | 35 | 1 | 12 | |
| New Hampshire | | | 1 | 17 | 1 | 1 | |
| Vermont | | | | 115 | | | |
| Massachusetts | 5 | | | 590 | 3 | | |
| Rhode Island | | | | 26 | | | |
| Connecticut | | | | 322 | | 21 | |
| **Middle Atlantic** | **6** | **11** | **1** | **4,295** | **9** | **69** | **5** |
| New York | 2 | 3 | (1) | 1,828 | 7 | 38 | 4 |
| New Jersey | 2 | 8 | 1 | 1,011 | | 26 | |
| Pennsylvania | 2 | | | 1,456 | 2 | 5 | 1 |
| **East North Central** | **3** | **7** | **11** | **4,159** | **11** | **133** | **11** |
| Ohio | 1 | | | 890 | 5 | | |
| Indiana | | 1 | 7 | 128 | | 20 | 2 |
| Illinois | 1 | 1 | 2 | 603 | 2 | 66 | 4 |
| Michigan | 1 | 5 | 2 | 649 | 3 | 47 | 2 |
| Wisconsin | | | | 1,889 | 1 | | 3 |
| **West North Central** | **3** | **1** | **17** | **1,147** | **7** | **20** | **6** |
| Minnesota | 1 | | | 122 | 2 | 3 | |
| Iowa | | | | 147 | | | 2 |
| Missouri | | | 5 | 229 | 4 | | 1 |
| North Dakota | | 1 | 12 | 106 | | 10 | |
| South Dakota | | | | 26 | | | |
| Nebraska | 1 | | | 15 | 1 | | 3 |
| Kansas | 1 | | | 502 | | 7 | |
| **South Atlantic** | **12** | **1** | **199** | **1,884** | **6** | **74** | **14** |
| Delaware | | | | 36 | | | |
| Maryland | 1 | | 2 | 256 | | 33 | 1 |
| District of Columbia | | | | 63 | | | |
| Virginia | 2 | | 187 | 797 | 1 | 22 | |
| West Virginia | 3 | | | 375 | | | 5 |
| North Carolina | 4 | | | 77 | 1 | | 3 |
| South Carolina | 2 | | 2 | 26 | 1 | 12 | 1 |
| Georgia | | | 8 | 125 | 2 | 7 | 2 |
| Florida | | 1 | | 129 | 1 | | 2 |
| **East South Central** | **7** | **5** | **22** | **585** | **9** | **105** | **4** |
| Kentucky | 1 | | 4 | 191 | 2 | 22 | |
| Tennessee | 4 | 3 | 16 | 134 | 3 | | 1 |
| Alabama | 2 | | | 237 | 4 | 61 | 2 |
| Mississippi | | 2 | 2 | 23 | | 22 | 1 |
| **West South Central** | **7** | **4** | **122** | **2,705** | **9** | **283** | **19** |
| Arkansas | 1 | | 84 | 213 | 3 | 29 | 1 |
| Louisiana | | | 1 | 230 | 1 | 38 | 3 |
| Oklahoma | | 2 | 37 | 209 | 3 | 26 | |
| Texas | 6 | 2 | | 1,963 | 2 | 190 | 15 |
| **Mountain** | **6** | **1** | **159** | **1,068** | | **59** | **10** |
| Montana | | | 15 | 81 | | 4 | |
| Idaho | | | | 126 | | | 2 |
| Wyoming | | | | 78 | | 1 | |
| Colorado | 4 | | 8 | 175 | | 21 | 1 |
| New Mexico | 2 | | | 155 | | 13 | |
| Arizona | | 1 | 136 | 393 | | 20 | 7 |
| Utah | | | | 56 | | | |
| Nevada | | | | 4 | | | |
| **Pacific** | **7** | **1** | **29** | **5,337** | **8** | **47** | **19** |
| Washington | | | | 1,025 | | 5 | 4 |
| Oregon | 1 | | 20 | 658 | 1 | 11 | 1 |
| California | 6 | 1 | 9 | 3,654 | 7 | 31 | 14 |
| Alaska | | | 4 | | | | |
| Hawaii | | | 7 | 21 | | | |

[1] New York City only.
*Anthrax:* New Jersey, 1 case.

## Reported Cases of Selected Communicable Diseases: United States, Week Ended May 26, 1951—Continued

[Numbers under diseases are International List numbers, 1948 revision]

| Area | Rocky Mountain spotted fever (104) | Scarlet fever (050) | Smallpox (084) | Tularemia (059) | Typhoid and paratyphoid fever [1] (040, 041) | Whooping cough (056) | Rabies in animals |
|---|---|---|---|---|---|---|---|
| **United States** | 13 | 1,667 | | 17 | 49 | 1,545 | 177 |
| **New England** | | 175 | | | 3 | 71 | |
| Maine | | 18 | | | | 21 | |
| New Hampshire | | [2] 6 | | | | 2 | |
| Vermont | | 3 | | | | 15 | |
| Massachusetts | | 120 | | | 3 | 10 | |
| Rhode Island | | 9 | | | | 15 | |
| Connecticut | | 19 | | | | 8 | |
| **Middle Atlantic** | | 328 | | | 4 | 123 | 12 |
| New York | | [2] 180 | | | | 43 | 7 |
| New Jersey | | 55 | | | | 51 | |
| Pennsylvania | | 93 | | | 4 | 29 | 5 |
| **East North Central** | 2 | 590 | | | 4 | 258 | 27 |
| Ohio | 1 | 137 | | | 1 | 37 | 3 |
| Indiana | | 20 | | | | 56 | 18 |
| Illinois | 1 | 55 | | | 2 | 19 | 1 |
| Michigan | | 351 | | | 1 | 79 | 4 |
| Wisconsin | | 27 | | | | 67 | 1 |
| **West North Central** | | 60 | | | | 80 | 51 |
| Minnesota | | 19 | | | | 4 | 3 |
| Iowa | | 3 | | | | 25 | 17 |
| Missouri | | 13 | | | | 9 | 28 |
| North Dakota | | 1 | | | | 17 | |
| South Dakota | | 11 | | | | 5 | |
| Nebraska | | 1 | | | | 4 | 2 |
| Kansas | | 12 | | | | 16 | 1 |
| **South Atlantic** | 8 | 72 | | 5 | 14 | 163 | 16 |
| Delaware | | 2 | | | | | |
| Maryland | 1 | 21 | | 1 | | 5 | |
| District of Columbia | | 7 | | | | 1 | |
| Virginia | 4 | 12 | | 2 | 1 | 44 | 2 |
| West Virginia | | 5 | | | | | 6 |
| North Carolina | 2 | 11 | | | | 71 | |
| South Carolina | | 5 | | | 4 | 3 | |
| Georgia | 1 | 2 | | 2 | 6 | 24 | 8 |
| Florida | | [2] 7 | | | 3 | 15 | |
| **East South Central** | 1 | 38 | | | 6 | 180 | 31 |
| Kentucky | | 14 | | | 2 | 52 | 12 |
| Tennessee | 1 | 20 | | | 1 | 31 | 8 |
| Alabama | | 2 | | | 2 | 76 | 6 |
| Mississippi | | 2 | | | 1 | 21 | 5 |
| **West South Central** | | 61 | | 12 | 11 | 434 | 35 |
| Arkansas | | 3 | | 6 | | 48 | |
| Louisiana | | 8 | | | 4 | 3 | |
| Oklahoma | | 5 | | 1 | 1 | 30 | 4 |
| Texas | | 45 | | 5 | 6 | 353 | 31 |
| **Mountain** | 2 | 71 | | | 2 | 125 | 2 |
| Montana | | 4 | | | | 10 | |
| Idaho | | 20 | | | 1 | 7 | |
| Wyoming | 2 | 1 | | | | 3 | |
| Colorado | | 11 | | | | 19 | 1 |
| New Mexico | | 1 | | | 1 | 20 | |
| Arizona | | 9 | | | | 56 | 1 |
| Utah | | [2] 25 | | | | 10 | |
| Nevada | | | | | | | |
| **Pacific** | | 272 | | | 5 | 111 | 3 |
| Washington | | 26 | | | | 25 | 1 |
| Oregon | | 15 | | | | 13 | |
| California | | [2] 231 | | | 5 | 73 | 2 |
| Alaska | | 4 | | | | | |
| Hawaii | | 3 | | | | 2 | |

[1] Including cases reported as salmonellosis. [2] Including cases reported as streptococcal sore throat.

# FOREIGN REPORTS

## CANADA

*Reported Cases of Certain Diseases—Week Ended May 5, 1951*

| Disease | Total | New-foundland | Prince Edward Island | Nova Scotia | New Brunswick | Quebec | Ontario | Manitoba | Saskatchewan | Alberta | British Columbia |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Brucellosis | 4 | | | | | 1 | | 2 | | | 1 |
| Chickenpox | 976 | 1 | | 48 | | 129 | 509 | 27 | 26 | 51 | 185 |
| Diphtheria | 3 | | | | 1 | 2 | | | | | |
| Dysentery, bacillary | 10 | | | | | | 4 | 1 | | | 5 |
| Encephalitis, infectious | 1 | | | | | | | | 1 | | |
| German measles | 444 | | | 20 | | 37 | 236 | | 30 | 46 | 75 |
| Influenza | 61 | | | 27 | 5 | | 1 | 17 | | | 11 |
| Measles | 1,679 | 4 | | 66 | 3 | 186 | 876 | 265 | 7 | 168 | 104 |
| Meningitis, meningococcal | 3 | | | | | | 2 | | | | 1 |
| Mumps | 768 | 1 | | 22 | 1 | 107 | 284 | 53 | 88 | 77 | 75 |
| Poliomyelitis | 3 | | | | | | 1 | 1 | | 1 | |
| Scarlet fever | 252 | 1 | | | 1 | 59 | 47 | 30 | 16 | 30 | 68 |
| Tuberculosis (all forms) | 205 | 19 | | 9 | 1 | 67 | 15 | 16 | 1 | 15 | 62 |
| Typhoid and paratyphoid fever | 7 | 1 | | | | 3 | 2 | | | | 1 |
| Venereal diseases: | | | | | | | | | | | |
| Gonorrhea | 271 | 4 | | 3 | 13 | 89 | 47 | 15 | 21 | 29 | 50 |
| Syphilis | 105 | 5 | | 10 | 3 | 55 | 16 | | 8 | 1 | 7 |
| Primary | 7 | | | | 1 | 1 | 2 | | 2 | | 1 |
| Secondary | 7 | 1 | | 1 | | 4 | 1 | | | | |
| Other | 91 | 4 | | 9 | 2 | 50 | 13 | | 6 | 1 | 6 |
| Whooping cough | 135 | | | 3 | 1 | 16 | 52 | 15 | 1 | 13 | 34 |

## FINLAND

*Reported Cases of Certain Diseases—March 1951*

| Disease | Cases | Disease | Cases |
|---|---|---|---|
| Diphtheria | 44 | Scarlet fever | 2,113 |
| Dysentery | 1 | Typhoid fever | 7 |
| Meningitis, meningococcal | 10 | Venereal diseases: | |
| Paratyphoid fever | 30 | Gonorrhea | 411 |
| Poliomyelitis | 7 | Syphilis | 25 |

## NORWAY

*Reported Cases of Certain Diseases—February 1951*

| Disease | Cases | Disease | Cases |
|---|---|---|---|
| Diphtheria | 9 | Pneumonia (all forms) | 3,296 |
| Encephalitis, infectious | 1 | Poliomyelitis | 14 |
| Erysipelas | 280 | Rheumatic fever | 95 |
| Gastroenteritis | 2,128 | Scabies | 757 |
| Hepatitis, infectious | 50 | Scarlet fever | 111 |
| Impetigo contagiosa | 1,367 | Tuberculosis (all forms) | 295 |
| Influenza | 5,548 | Venereal diseases: | |
| Malaria | 2 | Gonorrhea | 157 |
| Measles | 3,175 | Syphilis | 45 |
| Meningitis, meningococcal | 6 | Whooping cough | 1,607 |
| Mumps | 101 | | |

# CUBA

*Reported Cases of Certain Diseases, for 3 Periods*

4 weeks ended Feb. 24, 1951

| Disease | Total | Pinar del Rio | Habana: Habana City | Habana: Total | Matanzas | Santa Clara | Camaguey | Oriente |
|---|---|---|---|---|---|---|---|---|
| Brucellosis | 1 | | | | | | | 1 |
| Cancer | 75 | 4 | | 12 | 11 | 25 | 4 | 19 |
| Chickenpox | 86 | | 21 | 21 | 11 | | 4 | 50 |
| Diphtheria | 18 | | 8 | 10 | 5 | 1 | | 2 |
| Hookworm | 14 | | | 14 | | | | |
| Leprosy | 1 | | | 1 | | | | |
| Malaria | 24 | | 1 | 2 | | | 1 | 21 |
| Measles | 34 | | 11 | 20 | 1 | 2 | 1 | 10 |
| Poliomyelitis | 2 | | | | | | | 2 |
| Tetanus | 1 | | | | | | | 1 |
| Tuberculosis | 33 | | | 6 | 3 | 4 | 13 | 7 |
| Typhoid fever | 32 | 2 | 3 | 12 | 1 | 6 | 3 | 8 |
| Whooping cough | 48 | | | | | | 48 | |

5 weeks ended Mar. 31, 1951

| Disease | Total | Pinar del Rio | Habana: Habana City | Habana: Total | Matanzas | Santa Clara | Camaguey | Oriente |
|---|---|---|---|---|---|---|---|---|
| Cancer | 99 | 5 | | 17 | 19 | 22 | 5 | 31 |
| Chickenpox | 147 | | 59 | 82 | 5 | 8 | 31 | 21 |
| Diphtheria | 27 | 3 | 11 | 18 | 2 | 1 | | 3 |
| Hookworm | 13 | | | 13 | | | | |
| Leprosy | 3 | | | 1 | | | 1 | 1 |
| Malaria | 12 | | 1 | 1 | | 1 | 1 | 9 |
| Measles | 51 | | 33 | 34 | 3 | 11 | 2 | 1 |
| Poliomyelitis | 1 | | | | | | | 1 |
| Tuberculosis | 79 | 5 | | 19 | 16 | 16 | 10 | 13 |
| Typhoid fever | 56 | 3 | 4 | 10 | 3 | 12 | 5 | 23 |
| Whooping cough | 16 | | | | | | 6 | 10 |

4 weeks ended Apr. 28, 1951

| Disease | Total | Pinar del Rio | Habana: Habana City | Habana: Total | Matanzas | Santa Clara | Camaguey | Oriente |
|---|---|---|---|---|---|---|---|---|
| Cancer | 74 | 3 | | 13 | 13 | 22 | 2 | 21 |
| Chickenpox | 140 | | 46 | 51 | 3 | 25 | 47 | 14 |
| Diphtheria | 18 | 2 | 8 | 10 | 5 | | | 1 |
| Leprosy | 3 | | | 2 | | | | 1 |
| Malaria | 4 | | | | | | | 4 |
| Measles | 123 | | 30 | 37 | 2 | 30 | 25 | 29 |
| Poliomyelitis | 2 | | | | | | 1 | 1 |
| Tetanus | 2 | | | | 1 | | | 1 |
| Tuberculosis | 68 | 2 | 1 | 21 | 4 | 15 | 14 | 12 |
| Typhoid fever | 28 | 7 | 2 | 5 | | 8 | 3 | 5 |
| Whooping cough | 19 | | | 3 | | | 15 | 1 |

## REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

The following reports include only items of unusual incidence or of special interest and the occurrence of these diseases, except yellow fever, in localities which had not recently reported cases. All reports of yellow fever are published currently. A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

### Smallpox

*Ceylon.* For the week ended May 19, 1951, 26 cases of smallpox were reported compared with 2 for the previous week.

*Algeria.* During the period April 21–30, 1951, four cases of smallpox were reported compared with two for the previous 10-day period.

*Togo (French).* During the period May 1–10, 1951, five cases of smallpox were reported. These are the first cases reported since March 31.

*Venezuela.* During March 1951, 16 cases of alastrim were reported in Venezuela.

### Typhus Fever

*Turkey.* Five cases of typhus fever were reported in Turkey for the week ended May 19, 1951; two were in Istanbul and one in Trabzon.

*India.* Eight cases of typhus fever were reported in Bombay for the week ended May 12, 1951, compared with three for the previous week.

### Yellow Fever

*Gold Coast.* During the period May 5–8, 1951, four suspected cases of yellow fever were reported in Suhum. The patients were admitted to the hospital in Accra.

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The printing of this publication has been approved by the Director of the Bureau of the Budget (August 10, 1949).

The Public Health Reports, first published in 1878 under authority of an act of Congress of April 29 of that year, is issued weekly by the Public Health Service through the Division of Public Health Methods, pursuant to the following authority of law: United States Code, title 42, sections 241, 245, 247; title 44, section 220.

It contains (1) current information regarding the incidence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

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# Public Health Reports

VOLUME 66 JUNE 22, 1951 NUMBER 25

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FEDERAL SECURITY AGENCY

PUBLIC HEALTH SERVICE

FEDERAL SECURITY AGENCY

*Oscar R. Ewing, Administrator*

PUBLIC HEALTH SERVICE

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**Division of Public Health Methods**

*G. St. J. Perrott, Chief of Division*

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# Public Health Reports

*Vol. 66* • JUNE 22, 1951 • *No. 25*

## Mouse-Protective Potency Assay of Typhoid Vaccine

### —As Performed at the Army Medical Service Graduate School—

By H. C. BATSON, Ph. D., MARTHA BROWN, and MAURICE OBERSTEIN *

The need for an efficient, practical laboratory method for determining the potency of typhoid vaccines long has been recognized by immunologists concerned with the development, production, and assay of the product. The need in relation to production and control in routine manufacture of typhoid vaccine is mainly for a testing method which will permit the ready demonstration that an individual lot, or successive lots, of vaccine equal or exceed an established level of potency. Researchers, on the other hand, require an assay method which, in addition to the foregoing, permits quantitative estimation of potency, i. e., which permits numerical expression of potency in absolute or relative terms with an estimable degree of uncertainty. Only by the use of such a method is the investigator enabled to detect or evaluate differences or changes in potency as effected by experimental treatments or conditions of interest.

Methods early used in the determination of the potency of typhoid vaccines were based upon parenteral administration of the products to rabbits and subsequent *in vitro* determination of the agglutinin response (*15*), or the actual protection of such immunized rabbits against subacute infection following injection of living, virulent *Salmonella typhosa* (*18*). It is beyond the scope of this report to discuss or criticize these tests in detail and it is considered sufficient to state that such methods have proved to be neither adequately definitive nor reproducible to warrant their continued use.

Investigation and establishment by Siler and his associates at the Army Medical School (*22*) of the mouse-protection test for assessing the antibody response of humans to typhoid immunization stimulated interest in the adaptation of this technique to the assay of typhoid

*Director, Bacteriologist, and Research Assistant, respectively, Biologic Products Division, Army Medical Service Graduate School, Washington, D. C.

vaccines by means of active-immunity protection tests in mice. Although these workers did not employ this procedure as a control measure in relation to routine vaccine production, they did make extensive application of the method in evaluating experimental vaccines prepared from different strains of *S. typhosa* (*21*, *23*). Shortly thereafter, the National Institutes of Health adopted a similar mouse-protection potency test as official for release of commercially produced typhoid vaccine (*20*).

Relatively extensive studies on the mouse-protection test were conducted nearly simultaneously by Griffitts (*11*) and by Luippold (*17*). Methods proposed by these workers incorporated certain improvements in technique yet have failed to yield satisfactory reproducible quantitative results when employed in different laboratories or even in repeat tests conducted on the same product in the same laboratory.

In view of the continued need for a more reliable assay procedure, the Biologic Products Division, Army Medical Service Graduate School, has conducted an extensive study of the problem during the last 3 years. Phases of the study have dealt with the validity of certain assumptions regarding the nature of the immune response in mice, the validity and efficiency of assay procedure designs, the effects of associated or experimental conditions on quantitative results, the analysis and interpretation of assay results, etc. Results of these studies have been (*1*, *2*, *3*, *4*, *5*) or will be presented in detail and defended elsewhere. This report presents, essentially in didactic manner, the methods and procedures currently employed in these laboratories with the hope that such information will be of interest and aid to other workers responsible for conducting and interpreting potency assays on typhoid vaccine.

## Materials and Methods

### *General Principles of the Assay Method*

The potency assay of typhoid vaccine as currently performed in the Army Medical Service Graduate School is an active-immunity mouse-protection test in which the potency of an "unknown" vaccine is determined in relation to that of an arbitrarily selected reference standard vaccine.

The assay procedure involves the determination of the survival rates in successive groups of mice given graded doses of the vaccines and, subsequently, a constant challenge dose of viable *S. typhosa* suspended in 5-percent hog gastric mucin. In routine tests, only 2 doses or levels (referred to as low and high) of each, the unknown and the reference vaccine, are administered. In more exacting tests, in which it is wished to minimize the uncertainty of potency estimation, 3 or even 4 graded doses (levels) of each vaccine frequently are used.

The testing procedure, as presented here, is employed with either monovalent or triple typhoid vaccines. It has been the experience in these laboratories that such products apparently are of equal protective potency against challenge with *S. typhosa* provided they are of equal content of the specific organism. As yet no test has been developed for determining the protective potency of triple typhoid vaccine against *Salmonella paratyphi* (Para A) or *Salmonella schottmuelleri* (Para B).

*The Reference Standard Vaccine*

The particular vaccine currently used as a reference standard is a typical heat-killed phenol-preserved triple typhoid vaccine containing the equivalent of 1,000 million *S. typhosa* and 250 million each of *S. paratyphi* and *S. schottmuelleri* per ml. This vaccine was prepared in the same manner as are all lots of triple typhoid vaccine produced at the Army Medical Service Graduate School (*12*, *23*).[1]

A monovalent reference standard vaccine also has been prepared in a similar manner except for omission of the paratyphoid components. This vaccine is used as the reference in assays on experimental monovalent vaccines but, as stated previously, the data available fail to provide any evidence of a consistent difference in protective potency against *S. typhosa* challenge of the monovalent and triple typhoid reference vaccines.

The reference vaccines are maintained in both the lyophilized and the liquid states. The latter currently is employed in routine potency assays as extensive experience with these and similar vaccines has revealed no appreciable decrease in protective potency of either during a period of approximately 3 years.

In the assay procedure, an unknown lot of vaccine is compared directly with the reference vaccine in concomitant and identical tests. In practice, each of several unknown lots of vaccine frequently are compared with the same reference vaccine. Such tests on multiple unknowns are not truly independent, but the experience in these laboratories has not indicated this to be a major source of error.

*Bacterial Content of Vaccines*

Accurate determination of the potency of an unknown vaccine in relation to that of a standard (relative potency) is best accomplished when the bacterial content or density of the two are identical. Density determinations based upon photometric readings, or particularly upon direct counts, progressively decrease with aging of typhoid vaccines.

[1] In accordance with the assumptions upon which assays of this type are based, it is essential that the reference vaccine be prepared by a procedure identical with that employed in preparing the unknowns to be tested. Accordingly, this reference vaccine is suitable for use only in testing typhoid vaccines prepared by the heat-phenol method.

Such methods no doubt are sufficiently accurate for use in standardizing suspensions of freshly harvested organisms during production of vaccines, but it is considered that a more definitive quantitative determination is required for purposes of assay.

Preliminary experience with chemical determinations of the nitrogen content of typhoid vaccines has indicated that such data are sufficiently reproducible to serve as a basis for preliminary adjustment of samples to equal bacterial content. The method currently utilized in the determination of nitrogen content is that proposed by Simmons and Gentzkow (*24*) and involves micro-Kjeldahl digestion followed by nesslerization and comparison with prepared standards. The nitrogen content of the reference standard triple typhoid vaccine employed in this study has been determined as 0.041 mg. per ml. by this method. The nitrogen content of most routine lots of triple typhoid vaccine ranges from 0.040 to 0.045 mg. per ml.[2]

When necessary, unknown vaccines are adjusted by preliminary dilution with sterile normal saline to the same nitrogen content ($\pm$10 percent) as that of the reference vaccine. When lyophilized reference vaccine is employed, the dried material is rehydrated to original (or stated) volume with sterile triple distilled water.

### *Vaccine Dilutions*

Final dilutions of the reference vaccine (liquid or rehydrated) and of the unknown vaccines are prepared by dilution of appropriate volumes of each with sterile normal saline so that the desired individual quantities of vaccine are each contained in a unit volume of 0.5 ml.

The fold increments in quantities of vaccine administered at successive dosage levels depend, in part, upon whether two or more levels are used. Early in the study (*1*) it was found that approximately threefold increments in vaccine doses were required to effect significantly different survival rates in successive groups when 10 to 20 mice were used at each level. Such differences in survival were of the order of 15 percent and 50 percent. In practical assays it is desirable to obtain rates which bracket the 50 percent endpoint; ideally, about 15–20 percent through 80–85 percent (*19*). Accordingly, in 2-dose assays a tenfold increment in vaccine dosages is used, while in 3- and 4-dose assays, a threefold increment usually is employed.

The actual quantities of vaccine to be given as immunizing doses are markedly dependent upon the particular test mice available, the dose and virulence of the challenge strain of *S. typhosa*, the virulence enhancing activity of the mucin suspension used, and the environ-

[2] The chemical determinations of nitrogen content were performed by the Department of Biochemistry, Army Medical Service Graduate School, through the courtesy of Lt. Col M. E. Freeman.

mental conditions pertaining. Quantities required for optimal response vary markedly from laboratory to laboratory and from time to time in the same laboratory. Quantities currently being employed in these laboratories (October 1950) in 2-dose assays are 0.010 ml. and 0.100 ml. at the low and high dosage levels, respectively.

*Challenge Suspensions*

The challenge organism currently utilized in typhoid vaccine assays is a V form substrain (*14*) of *S. typhosa*, strain 58. Cultures are maintained continuously in the lyophilized state, a separate ampule of dried organisms being used for each assay.

The ampule is opened approximately 21 hours previous to the scheduled time of challenge, and the dried organisms are suspended in a small quantity of tryptose-glucose broth.[3] This seed suspension is inoculated into two 10 ml. tubes of the tryptose-glucose medium and incubated at 37° C. for 4 hours. Following preliminary incubation, 0.2 ml. of one of the actively growing cultures is transferred to each of 5 tubes of tryptose-glucose broth and these, in turn, are incubated at 37° C. for 16 hours.

Approximately 1 hour before the scheduled time of challenge, each of the five broth cultures of *S. typhosa* is mixed thoroughly with a 5 ml. pipette, and 5 ml. from each culture are pooled in a small Erlenmeyer flask. The pooled broth culture is shaken thoroughly, and 1 ml. is transferred to the first of a series of 9 ml. saline dilution blanks. Serial tenfold dilutions then are prepared through $10^7$ using a separate sterile 1 ml. pipette for each serial dilution transfer. Nine 1 ml. aliquots of the final $10^7$ dilution then are plated with veal infusion agar. These plates are incubated at 37° C. for 24 hours, the colony counts determined, and the average of such counts $\times 10^7$ taken as the most probable viable count per ml. of the original pooled broth culture. Such average counts usually are between 50 and 55 $\times 10^7$ and have been found sufficiently reproducible that, following a few such determinations, the count to be obtained can be predicted with remarkable accuracy.

The final challenge suspension is prepared by adding a calculated quantity (based on the predicted count) of the pooled broth culture, or of one of the lower dilutions, to the desired quantity of sterile 5 percent mucin to yield a final concentration of approximately 1,000 viable *S. typhosa* per 0.5 ml. of the mucin suspension. Care is exercised to use as small an amount of broth culture or saline dilution as is practicable so that dilution of the mucin suspension will be minimal.

The size of the challenge dose (number of viable organisms) has much less effect on mouse survival than does the size of the immunizing

[3] Bacto-tryptose, 2 percent, U. S P. glucose, 0 5 percent; C. P. NaCl, 0.5 percent, final pH 7.6.

dose. On occasion it has been considered advisable to employ a challenge dose of 10,000 viable *S. typhosa*. Ordinarily the $LD_{50}$ of the challenge organisms for unprotected mice, as determined in these laboratories, is less than 10 organisms.

The inoculated mucin suspension is mixed thoroughly and the viable bacterial content checked by plating dilutions as follows: 1 ml. of inoculated mucin is diluted 1: 100 (two serial tenfold dilutions) with sterile saline and nine 1 ml. aliquots of the final dilution are plated with veal infusion agar. Following incubation for 24 hours at 37° C., the plate counts are determined and averaged. The original viable count of the mucin suspension per 0.5 ml. then is estimated as the average plate count $\times$ 50. Any count between 750 and 1,250 is considered a satisfactory approximation of the desired 1,000 challenge dose.

All injections of the challenge suspension are accomplished within 2 hours of the time the 16-hour broth cultures are pooled.

### *Mucin Suspensions*

Mucin suspensions routinely employed in these laboratories for enhancement of virulence of *S. typhosa* are prepared from dehydrated hog gastric mucin (Wilson, Type 1701–W) and are sterilized by intermittent heating. Fifty-gram unit quantities of dried mucin each are homogenized in 1 liter of cold distilled water with the aid of a Waring Blendor. The homogenized material is stored in the refrigerator (4° to 6° C.) for 26 to 30 hours, heated in a bath of boiling water for 5 minutes, filtered through a thin, absorbent cotton-gauze filter to remove gross particles and dispensed in 500 ml. quantities. Following dispensing, the pH is adjusted to 7.3–7.4 with 1N NaOH, and the suspension is sterilized by heating in a bath of boiling water for three 25-minute periods during the next 30 hours. The suspensions are kept in the refrigerator at all times except during actual heating. Tests for sterility, toxicity, and virulence enhancing activity are performed on each batch of mucin suspension prepared.

Experience has indicated that the activity of such suspensions remains essentially unaltered during months of storage under refrigeration. Accordingly, suspensions are prepared in total quantities sufficient (5 to 10 liters) for all assays during an extended period of time.

### *Test Mice*

As far as is known, any strain of mice highly susceptible to experimental infection with virulent strains of *S. typhosa* is satisfactory for use in the potency test. In assays currently being performed in these laboratories, female CFW strain mice (Carworth Farms), weighing 13 to 15 grams, are used routinely. On occasion it is neces-

sary to use male mice, but mixed sexes are not employed in the tests.

The test mice are obtained at least 24 hours prior to beginning the assay. The mice are selected individually at random and are assigned to mouse jars until each jar contains a group of 5 mice. The groups of mice (by jars) are then numbered at random to correspond to numbered spaces on the assay protocol and, furthermore, the jars are assigned at random to locations in the animal test room. The temperature of the room is maintained at 80° F. as closely as practicable.

A minimum of 20 mice (4 groups of 5 each) are employed at each dosage level of each vaccine. An additional 20 mice (4 groups of 5 each) are set aside for use as challenge dose controls. Larger numbers of mice frequently are utilized in critical tests, but an equal number always is assigned to each vaccine-dosage group. A typical assay of a single unknown vaccine thus requires a minimum of 100 mice (20 groups of 5 each) assigned as follows:

| *Assignment* | *Dose* | *Mice* |
|---|---|---|
| Unknown vaccine | Low | 20 |
| | High | 20 |
| Reference vaccine | Low | 20 |
| | High | 20 |
| Challenge controls | | 20 |
| Total | | 100 |

*Immunization and Challenge Procedure*

Active immunization of the mice is accomplished by intraperitoneal injection of the vaccine dilutions (in 0.5 ml. volumes). Five ml. syringes graduated to 0.5 ml. and 23 gage, ¾-inch needles have been found convenient for this purpose. The mice selected for challenge dose controls similarly are injected with 0.5 ml. of sterile normal saline.

The mice are challenged 6 days following immunization. The inoculated mucin suspension is administered intraperitoneally by means of a 5 ml. syringe graduated to 0.5 ml. and a 22 gage, 1-inch needle. All mice, including the nonimmunized controls, are injected by groups in random order.

*Recording Results*

The mice are checked daily for 3 days and the results, in terms of survivors/total in each group at the end of the observation period, are recorded. The procedure and all data pertaining to each assay are recorded in detail in notebooks, but to facilitate maintenance of records and calculation of potency, all essential data and results are summarized on a protocol sheet (see sample form). The data entered on the form are taken from an actual 2-dose assay run on August 24, 1950.

**TYPHOID VACCINE ASSAY PROTOCOL**

| | | | |
|---|---|---|---|
| Assay number | 121-11 | Vaccine doses: | |
| Vaccine | Lot 584 | Low 0.015 ml. | High 0.150 ml |
| Reference | L S -1 | Mucin lot | 305 |
| Mice | CFW, F, 13-15 gm | Challenge | 58, 1000/0.5 ml |
| Immunization date | 21 Aug., 1950 | Actual count | 1200/0.5 ml |
| Challenge date | 30 Aug., 1950 | Relative potency | 165%±82.5% |

**Results**

**(Survivors/Totals)**

| Lot 584 | | | | Reference L S -1 | | | | Challenge dose controls | |
|---|---|---|---|---|---|---|---|---|---|
| Low dose | | High dose | | Low dose | | High dose | | | |
| (1) 2/5 | (2) 2/5 | (3) 4/5 | (4) 5/5 | (5) 1/5 | (6) 1/5 | (7) 1/5 | (8) 4/5 | (9) 1/5 | (10) 0/5 |
| (11) 1/5 | (12) 1/5 | (13) 2/5 | (14) 5/5 | (15) 2/5 | (16) 0/5 | (17) 4/5 | (18) 2/5 | (19) 0/5 | (20) 0/5 |

Operator.............................

Typical protocol of mouse-protection potency assay of typhoid vaccine.

## Analysis and Interpretation of Results

### 1. Acceptability of Data

Assay data, such as are obtained in the tests described here, can be subjected to formal statistical analysis to determine their suitability for calculation of relative potency. However, such analyses are time consuming and, in general, the same safeguards can be accomplished arbitrarily by prescribing certain criteria for acceptability of data. The following criteria have been found entirely practicable and currently are followed in these laboratories.

*Survival of Immunized Mice Prior to Challenge*

At least 90 percent (18 of 20) of all mice originally assigned to each vaccine-dosage or challenge-dose control group must survive from the beginning of the assay until the time of challenge. Deaths prior to challenge are very rare among mice obtained from healthy stock and given proper care.

*Survival of Challenge-Dose Control Mice*

Not more than 15 percent (3 of 20) of the nonimmunized control mice shall survive the 3-day period following challenge. Usually 100 percent succumb, but individual mice highly refractory to experimental infection with *S. typhosa* occasionally are observed.

*Survival of Immunized Mice Following Challenge*

Among mice given the reference vaccine, the results must reveal a definite increase in survival with increased vaccine dose. Furthermore, less than 50 percent of those given the lowest dose of vaccine and more than 50 percent of those given the highest dose must survive the 3-day period following challenge. Thus, in a 2-dose assay where 20 mice are used at each dosage level, the maximum acceptable ranges of survival at the low and high dosage levels are 0 to 9 of 20 (0 to 45 percent) and 11 to 20 of 20 (55 to 100 percent), respectively. Ideally, the survivals at the low- and high-dosage levels should be about 3 of 20 (15 percent) and 17 of 20 (85 percent).

The survival of mice given the unknown vaccine likewise must meet the foregoing criteria if an estimate of relative potency is to be obtained. On occasion, such as when testing high potency experimental vaccines, survival at both (or all) dosage levels may be so great that the endpoint of 50 percent survival is not bracketed, i. e., more than 50 percent of mice given the lower dose(s) of vaccine will survive. When experience indicates that such results truly are due to high potency and are not resulting from sampling variation, preliminary dilutions of the unknown vaccine should be made so as to bring the dosage-response data into general conformity with the foregoing. Since the primary objective of a potency test usually is to determine merely whether or not the unknown equals or exceeds the reference vaccine in potency, results such as are referred to could be considered acceptable for release of the vaccine on test.

### 2. Analysis of 2-Dose Assay Data—The Knudsen-Curtis Method

Several methods of calculating the relative potency of vaccines are available (*8, 10, 13, 16*). These procedures differ somewhat in regard to details, such as to the particular assumptions underlying the computational procedure and the particular transformation of dosage-mortality data used, but the end results as calculated by the different methods generally are in close agreement. It has been the experience in these laboratories that, provided good data are available, such as those meeting the previously stated criteria for acceptability, it is a matter of little consequence just which computational procedure is employed. In fact, even when just the approximate $ED_{50}$ values of both the unknown and the reference vaccine are estimated by a simple

*Transformation of percentage to angle values* *

[The angle values in the body of the table correspond to each percentage of response (survival) listed alon the left edge and top. *For example:* the angle value corresponding to 15 percent is 22.8]

| Percent | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 0 | 5.7 | 8.1 | 10.0 | 11.5 | 12.9 | 14.2 | 15.3 | 16.4 | 17.5 |
| 10 | 18.4 | 19.4 | 20 3 | 21 1 | 22 0 | 22.8 | 23.6 | 24.4 | 25.1 | 25.8 |
| 20 | 26 6 | 27 3 | 28.0 | 28.7 | 29 3 | 30 0 | 30.7 | 31 3 | 31.9 | 32.6 |
| 30 | 33.2 | 33 8 | 34.4 | 35.1 | 35.7 | 36.3 | 36.9 | 37.5 | 38.1 | 38.6 |
| 40 | 39.2 | 39.8 | 40.4 | 41.0 | 41.6 | 42.1 | 42.7 | 43.3 | 43.9 | 44.4 |
| 50 | 45 0 | 45.6 | 46.1 | 46.7 | 47.3 | 47.9 | 48.4 | 49 0 | 49 6 | 50.2 |
| 60 | 50 8 | 51 4 | 51.9 | 52.5 | 53.1 | 53.7 | 54 3 | 54.9 | 55.6 | 56.2 |
| 70 | 56.8 | 57.4 | 58.1 | 58.7 | 59.3 | 60.0 | 60.7 | 61.3 | 62.0 | 62.7 |
| 80 | 63.4 | 64 2 | 64.9 | 65 6 | 66 4 | 67 2 | 68.0 | 68.9 | 69.7 | 70 6 |
| 90 | 71.6 | 72 5 | 73.6 | 74.7 | 75.8 | 77.1 | 78.5 | 80.0 | 81.9 | 84.3 |
| 100 | 90 0 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- |

*With permission, abridged from table 16.8, Snedecor (*25*).

approximate graphical method (*19*), the ratio of the reciprocals of these endpoints generally is in close agreement with the relative potency calculated by more exacting but far more laborious means. Such an approximate method does not provide an estimate of the error of the assay, however, and, as such estimates frequently are useful in interpreting the results of assays on individual lots of vaccine, it is considered advisable to employ one of the more complete computational methods.

The method found most generally useful in these laboratories is that proposed by Knudsen and Curtis (*13*). The Knudsen-Curtis method involves the transformation of percentage response data (survival or mortality) to angle values (*6*), as given in the table, and is adaptable to assays based on several dosage levels but is particularly advantageous for calculating the results of 2-dose assays.

The original publication (*13*) should be referred to for full details, but calculations can be performed readily with no further guidance than that provided here in synopsis form.

### *Relative Potency*

Estimation of relative potency is accomplished by means of the following equation:

$$\text{(1)} \qquad \text{Potency as percent of standard} = \text{antilog}\left(2+\frac{iV}{W}\right)$$

where: i=log ratio of doses, i. e., log (high dose/low dose).

$V = U_L - S_L + U_H - S_H.$

$W = S_H - S_L + U_H - U_L.$

and

$$\left.\begin{array}{l} U_H = \text{response to high dose of the unknown} \\ U_L = \text{response to low dose of the unknown.} \end{array}\right\} \text{All in terms of angle values.}$$

$S_H$=response to high dose of standard.

$S_L$=response to low dose of standard.

An example of the use of the Knudsen-Curtis method in calculating the relative potency of an unknown lot of typhoid vaccine from the results of a 2-dose test is afforded by the data presented in the sample form and summarized as follows:

| Vaccine | Lot 584 | | Standard | |
|---|---|---|---|---|
| Dose (ml.) | 0 015 | 0.150 | 0.015 | 0.150 |
| Response: | | | | |
| Survivors/total | 6/20 | 16/20 | 4/20 | 14/20 |
| Percent survival | 30 | 80 | 20 | 70 |
| Angle values | 33.2 | 63.4 | 26.6 | 56.8 |

Calculation of relative potency by means of equation (1):

$$i=\log\ (\text{high dose/low dose})=\log \frac{0.150}{0.015}=\log 10=1.$$

$$V=U_L-S_L+U_H-S_H=33.2-26.6+63.4-56.8=13.2$$

$$W=S_H-S_L+U_H-U_L=56.8-26.6+63.4-33.2=60.4$$

$$\text{Potency as percent of standard}=\text{antilog}\left(2+\frac{iV}{W}\right)$$

$$=\text{antilog}\left(2+\frac{(1)(13.2)}{60.4}\right)$$

$$=\text{antilog}\ (2+0.2185)$$

$$=165\text{ percent}$$

*Standard Error of the Assay*

Calculation of the standard error of the assay in a 2-dose test requires three values:

1. A constant, 2.303.
2. The standard error of the log ratio of potency, symbolized as $\sigma_M$.
3. The relative potency in percent, calculated as above.

The standard error of the assay then is calculated by the following equations:

(2) Standard error of the assay $=(2.303)\ (\sigma_M)$ (potency)

The value of $\sigma_M$ is determined as follows:

$$(\sigma_M)^2=\frac{(i)^2(57.3)^2}{n}\times\frac{(W^2+V^2)}{W^4} \quad (3)$$

where: i, V and W are the same as previously given.

n = the number of mice at each dose.

$(57.3)^2=3283.3=$ a constant.

A computational example again is afforded by the data presented in the sample form and by the foregoing calculation of relative potency from these data. First, using equation (3):

$$(\sigma_M)^2=\frac{(i)^2(57.3)^2}{n}\times\frac{(W^2+V^2)}{W^4}$$

$$=\frac{(1)^2(57.3)^2}{20}\times\frac{[(60.4)^2+(13.2)^2]}{(60.4)^4}$$

$$=(164.16)\times(0.000287)$$

$$=0.0471$$

and

$$\sigma_M=\sqrt{0.0471}=0.217$$

Then substituting appropriate values in equation (2):

Standard error $=(2.303)\ (\sigma_M)$ (potency in percent)
$=(2.303)\ (0.217)\ (165)$
$=82.5$ percent

Thus, the potency of vaccine lot 584 in relation to the reference standard is 165 percent ± 82.5 percent.

*Notes*

A. In all 2-dose assays performed identically as here described (20 mice per group and a tenfold increment between low and high dose) the equation for calculation of $(\sigma_M)^2$ can be simplified further as all items in the expression $\frac{(i)^2(57.3)^2}{n}$ are constant. Thus the equation reduces to

$$(\sigma_M)^2=164.16\times\frac{(W^2+V^2)}{W^4}$$

Substituting the appropriate values from the foregoing example:

$$(\sigma_M)^2=164.16\times\frac{[(60.4)^2+(13.2)^2]}{(60.4)^4}$$
$$=0.0471$$

the same value as previously obtained.

B. When 1 or 2 mice of a vaccine-dosage group die prior to challenge, angle values corresponding to the actual percentage of survivors out of the total tested are employed. However, when calculating the standard error of the assay, the slight discrepancy in the value of $n$ which results from the unequal numbers in the various groups is ignored without introducing appreciable error.

### 3. Interpretation of Results

*Acceptable Potency*

Following completion of the inspection and analysis of the assay data, the unknown vaccine is considered of acceptable potency provided:

A. The assay data are acceptable in accordance with the prescribed criteria.

B. The relative potency of the unknown is at least 60 percent of that of the reference vaccine.

Potencies ranging from 60 to 75 percent of the reference standard are considered borderline. In these cases, the calculated percentage relative potency must not differ from the expected potency of 100 percent by more than twice the standard error of the assay.[4]

*Repeat Tests*

In case an assay is unsatisfactory because of unsuitability of data, the results are ignored and the test is repeated with such adjustment of vaccine dosage as may be indicated.

When the assay results meet the requirements for suitability of data but the relative potency is less than 60 percent of the reference vaccine, or the potency is borderline (60 to 75 percent) and the difference between the calculated potency and the expected value of 100 percent is more than twice the standard error of the assay, the test is repeated employing twice as many mice (at least 40) at each vaccine-dosage level of both the unknown and reference vaccine. Such repeat tests are performed as two separate assays and the relative potency is calculated independently in each case. For acceptability, the results of both assays must meet requirements A and B as specified above.

Assays in which the data are suitable but the potency of the unknown is less than 60 percent of the reference standard are not repeated more than once.

## Discussion

The assay procedure presented for determining the immunogenic potency of typhoid vaccines has been adopted tentatively by the Biologic Products Division, Army Medical Service Graduate School, since it is considered to be a practical compromise procedure which will yield a maximum of information consistent with reasonably economical laboratory management. Extensive experience with this procedure has revealed that the results obtained are more closely reproducible than those obtained with procedures previously employed. Furthermore, it has been found possible, by deliberate experimentation, to distinguish between vaccines of known different immunogenic activity for the mouse.

The basic requirements of a satisfactory biological assay have been presented in outline form by Bliss (7). The following is the essence

[4] This limit was established more or less arbitrarily for the sake of convenience and corresponds to approximately the 2.5 percent significance level. If it is desired to use the 5-percent significance level for rejection, the determined relative potency must not be less than 100 percent by more than 1.645 times the standard error of the assay.

of these requirements as reviewed by Emmens (*9*) with general comments as to the degree the reported procedure meets or fails to meet these requirements:

1. "Different samples of the same drug should show the same relative potencies in biological assay as under clinical test." The proposed method in no way meets this requirement, a criticism equally applicable to all laboratory assays of this type.

2. "On the co-ordinates used for biological assay the curve relating response to log dose should be a straight line and relatively steep when compared with the variation about the line." The proposed procedure, being a 2-dose test, does not provide for any test for linearity of the dosage-response curve. However, extensive preliminary studies (*1*, *2*) have established with adequate certainty that in this type of assay the relationship between log dose and survival in terms either of probits or angle values is linear. The steepness (slope) of the line is a function of the heterogeneity of the mice employed and cannot be changed by mere redesign of the assay procedure.

3. "The potency of the unknown or sample should be determined by comparative tests with a stable reference standard and expressed in units of this standard." This requirement is met fully and, in the authors' opinion, constitutes the most important feature of the method.

4. "The living material exposed to different doses of the standard and unknown must be as nearly equivalent as it can be made. Potential sources of variation, such as differences between individuals, litters, dates of treatment and sexes, should never coincide or be confounded with differences in treatment, but within these limitations the dosages and samples must be assigned at random." The specific materials and randomization procedures employed were so selected as to meet this requirement.

5. "A determination of potency should always include an estimate of its error, computed as an integral part of the assay." This requirement likewise is met and agreed upon in principle. However, it is questioned whether or not such an estimate truly serves the purpose the uninitiated reader logically may assume it does. The error of the assay, as calculated, is essentially a theoretical value based upon the expected vagaries of sampling from a binomially distributed population and does not take into account between-tests and other types of variation which are the bane of the assayist's existence. Stating it mildly, it is disquieting to the laboratory worker to obtain results from two tests on the same product which differ markedly more than would be expected from the estimated error of either.

To the foregoing, Emmens (*9*) adds an additional requirement ". . . that the assay methods should give reproducible results, which

should be consistent with internal indications of precision, and that this precision should not alter violently from test to test or from time to time." The merit of this requirement is granted and, if "reproducible" is considered a relative term, the requirement is attainable by the proposed method. Reproducibility can be increased, of course, by employing 3, 4, or even more vaccine-dosage levels and large numbers of mice at each level. However, the cost of such assays severely limit their practical value. Likewise, determination of the consistency of internal indications of precision with the reproducibility of results, while certainly a laudable objective, requires extensive statistical analysis which not only is time consuming but also is beyond the present level of training and experience of the overwhelming majority of individuals charged with the responsibility for conducting such assays. Employment of certain criteria for acceptability of assay data, as prescribed, does much to alleviate the necessity for extensive statistical analysis even though such restrictions do introduce an element of bias.

It has been found in these laboratories that differences in the susceptibility of mouse strains, virulence of challenge organisms, virulence enhancing activity of different mucin suspensions, and other experimental factors exert a profound effect on absolute estimates of potency such as $ED_{50}$ values. Further experiments, to be reported elsewhere, have indicated that, in general, such effects can be eliminated or controlled by use of a reference vaccine and by expressing the potency of an unknown in relative terms in respect to the standard. It is not known, however, how such factors affect the precision of quantitative differentiation between products truly differing in potency. Studies in this regard are now in progress.

In the choice of a computational procedure, full consideration was given to the level of mathematical understanding and skill required and to the time and effort involved in calculations. The Knudsen-Curtis method was selected as the procedure of choice since experience has indicated that results of analyses by this method were in close agreement with those obtained by other statistically valid methods and the computational procedures were less tedious, particularly when dealing with the results of a 2-dose assay. While it is advantageous to employ an electric calculator in such analyses, no computations are involved in analysis of 2-dose assay data that are not readily performed with logarithms.

The true nature of an "error of the assay" is not clearly understood by many laboratory workers. The standard error is a measure of the degree of variability that could be expected in repeat tests performed under identical conditions. However, even under identical conditions, only two-thirds of such repeat tests theoretically should fall between the limits: (a) expected percent potency minus the standard error and (b) expected percent potency plus the standard error. Ninety-five



944500—51——3

percent of repeat tests should fall between the broader limits: (a′) expected percent potency minus twice the standard error and (b′) expected percent potency plus twice the standard error. Unfortunately, identical conditions seldom (if ever) obtain, and in repeat tests actually performed in the laboratory even a greater range of values not uncommonly is experienced.

In a study recently completed in these laboratories (*5*), a series of six pairs of identical assays was performed on a reference vaccine, each pair of assays being conducted at a different time. The members of each pair were designated as A or B prior to performing the tests and, from the resultant data, the relative potency, B as percent of A, was calculated in each case. The expected relative potency was 100 percent in each instance, of course. The relative potencies, as calculated, ranged from 51 percent to 195 percent; a range in reasonable agreement with what would be expected from the standard errors of individual tests.

The lower limit of acceptable potency, 60 percent of that of the reference standard, was not established in a purely arbitrary manner. This level was approximated from the calculated standard deviation of the six relative potency values determined on the reference vaccine just referred to, i. e., the expected relative potency of 100 percent minus one standard deviation, as calculated from the series of relative potencies, approximated 60 percent. Consequently, it is to be expected that if assays were run on a series of vaccines all of which were exactly equal in potency to that of the reference standard, approximately 16 percent would fail to pass the test as a result of testing variation alone. However, it is quite improbable (about 1 chance in 40) that any single vaccine would fail to pass both an original and a repeat test if the potency actually were equal to that of the reference standard.

## Summary

The assay procedure for the routine determination of potency of typhoid vaccine tentatively adopted by the Biologic Products Division, Army Medical Service Graduate School, is presented in detail.

The assay is a 2-dose active-immunity mouse-protection test in which the potency of an unknown is determined in direct comparison with that of an arbitrarily selected reference standard vaccine.

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# A Rapid Flocculation Test for the Diagnosis of Trichinosis

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The value of complement fixation and precipitin reactions as aids in the diagnosis of trichinosis has been pointed out by Bozicevich (*1*), Culbertson (*2*), and others. However, certain of these tests have disadvantages, including the long period of time before results are obtained, the occurrence of nonspecific reactions, and the requirement of highly trained personnel. Suessenguth and Kline (*3*) described a flocculation test for trichinosis in which the antigen consisted of cholesterin crystals coated with an alkaline aqueous extract of powdered trichina larvae. In our hands, their flocculation test gave some falsely positive reactions, and the antigen was not stable. It is hoped that the flocculation test herein described may overcome many of these difficulties so that a rapid and specific test for the diagnosis of trichinosis will be available.

## Materials and Methods

### *Preparation of Trichina Extract*

1. Infect medium-sized adult rats by inoculating intragastrically with infective larvae of *Trichinella spiralis*.
2. At the end of 2 months sacrifice animals; skin and eviscerate.
3. Examine muscle samples for larvae, and use only heavily infected carcasses.
4. Put carcasses through meat grinder.
5. Add 70 gm. of ground meat to a battery jar containing 3 liters of artificial gastric juice. The digestive fluid is prepared by adding 21 ml. of HCl (specific gravity 1.10–1.19) to 3 liters of tap water (37°–40° C.) and then adding 15 gm. of pepsin.
6. Slowly agitate the mixture, by means of a stirring apparatus, for 6 hours at 37° C.
7. Pour mixture through one layer of surgical gauze (35 to 40 mesh apertures to the inch) into a 3-liter glass funnel, the stem of which is fitted with a 15-ml. conical centrifuge tube by means of a rubber tube.

*From the Laboratory of Tropical Diseases, Microbiological Institute of the National Institutes of Health, Public Health Service. Valuable assistance was provided by J. Robert Buchheit in the performance of the flocculation test.

8. Allow mixture to stand for 1½ hours so that the larvae will settle to the bottom of the centrifuge tube.

9. Close a pinchcock on the rubber tube between the funnel stem and centrifuge tube and remove the tube containing the larvae.

10. Pipette off supernatant fluid as closely as possible to the settled larvae; refill tube with physiological saline, and allow to settle for 10–15 minutes. Repeat this procedure (usually 5 to 6 times) until the larvae are free of rat protein.

11. Suspend 2 ml. of settled larvae in 8 ml. of physiological saline and transfer to a 10-ml. Ten Broeck tissue grinder.

12. Thoroughly grind larvae; transfer to flask containing 90 ml. physiological saline, and allow to extract at 4° C. for 24 hours.

13. Centrifuge the suspension in 20-ml. culture tubes at approximately 3,000 rpm for 15 minutes (International Centrifuge, size 2, No. 240 head).

14. Pour off and save supernatant; discard sediment.

15. Centrifuge the supernatant at 15,000 rpm for 15 minutes in an International Multispeed Centrifuge or Servall Centrifuge, Model SS–2. If a high-speed centrifuge is not available, the suspension can be filtered through a sintered glass filter of fine porosity (UF). Filters which readily adsorb protein are not satisfactory. The supernatant fluid or the filtrate, as the case may be, is the trichina extract.

*Preparation of Stock Bentonite*

1. Suspend 0.5 gm. of BC micron or No. 200 standard Volclay (Wyoming bentonite) [1] in 100 ml. of distilled water.

2. Homogenize in Waring Blendor for 1 minute.

3. Transfer bentonite suspension to 500-ml. glass-stoppered graduate and add distilled water to make 500 ml.

4. Shake thoroughly and allow to settle for 1 hour.

5. Pour off and save supernatant, discard sediment.

6. Pour supernatant into 100-ml. centrifuge tubes and centrifuge, by tachometer, at 1,300 rpm for 15 minutes. Use International Centrifuge, size 2, with No. 240 head.

7. Pour off and save supernatant; discard sediment.

8. Centrifuge supernatant in 100-ml. tubes at 1,600 rpm for 15 minutes.

9. Pour off supernatant and discard it.

10. Resuspend sediment in 100 ml. distilled water and homogenize in Waring Blendor for 1 minute. This is the stock bentonite which,

[1] We wish to express our appreciation to Paul Bechtner of the American Colloid Co., Merchandise Mart Plaza, Chicago 54, Ill., for generously supplying samples of Volclay and information concerning the properties of the product.

in our experience, has remained stable for as long as 4 months without losing its adsorptive properties.

When aliquot samples from the same lot of bentonite were suspended in identical volumes of water, different densities were obtained. Attempts to standardize bentonite suspensions by spectrophotometric methods were unsuccessful. It is important to have colloidal particles of the size which are obtained by centrifugation at 1,300–1,600 rpm (relative centrifugal force of approximately 500 to 750). The larger colloidal particles obtained by centrifugation at speeds of less than 1,300 rpm tend to flocculate spontaneously, thus giving falsely positive reactions in the test, while the smaller particles, obtained by centrifugation at speeds greater than 1,600 rpm, do not tend to flocculate even in the presence of a positive serum, thus giving falsely negative reactions. Furthermore, the smaller particles often float, making it difficult to read the test. We have noted that if the stock bentonite, which has been suspended in 100 ml. of fresh distilled water after the 1,600 rpm centrifugation, is now centrifuged at 1,300 rpm, practically all of the particles are thrown down. Apparently changes occur in the physical properties of the bentonite; however, these changes do not interfere with the performance of the test It should be stressed that distilled water only should be employed in the bentonite preparation; otherwise, if electrolytes are used in the process, the bentonite may flocculate spontaneously.

*Preparation of Stock Antigen*

1. Add 10 ml. of trichina extract to 20 ml. of stock bentonite and allow to adsorb at 4° C. for 15 to 18 hours.

2. Add 5 ml. of a 0.1 percent Thionin Blue O (C. I. No. 926) solution, prepared in distilled water, to the above 30 ml. of sensitized bentonite. A variety of basic and acidic dyes were tried but only certain of the basic dyes proved satisfactory.

3. Shake thoroughly and allow 1 hour for adsorption of the dye. This is the stock antigen In our experience, this antigen has retained its antigenic properties for relatively long periods of time if kept at 4° C., but it has a tendency to flocculate spontaneously.

*Preparation of Slides and Antigen Pipettes*

By means of a multiple ring maker prepare twelve wax rings on a clean 3- by 2-glass slide. The wax is of the composition recommended by Mazzini (*4*), 50-gm. sealing wax to 20-gm. paraffin. Before preparation of the wax rings the slides should be meticulously cleaned with a mild abrasive cleanser and rinsed in alcohol to free them of grease.

The pipettes used in dispensing the antigen are prepared from pyrex glass tubing with 3- to 4-mm. inside diameter. Each pipette is

pulled out to a diameter which will permit a delivery of 60 to 80 drops of antigen per ml.

*Preparation of Test Antigen*

1. Thoroughly shake stock antigen and transfer 8-ml. to a 16- by 150-mm. culture tube.

2. Add 10 ml. of physiological saline, shake thoroughly and centrifuge for 5 minutes at 2,500 rpm (International Centrifuge, size 2, No. 240 head).

3 Discard supernatant fluid and resuspend sediment in 15 ml. of physiological saline

4. Centrifuge for 5 minutes at 2,500 rpm as before and discard supernatant.

5. Resuspend sediment in 4 ml. of physiological saline.

6. *Antigen adjustment.* Up to this point in its preparation, the antigen has a tendency to flocculate spontaneously. In order to keep the colloidal particles dispersed, it is necessary to add a nonionic surface active agent. In our experience, the anionic and cationic agents were unsatisfactory. Add 0.5 ml. of a 1 percent distilled water solution of Tween 80 (polyoxyethylene sorbitan monooleate) to the 4 ml. of antigen suspension and shake thoroughly.

A saline and negative serum control must be performed to determine whether or not the Tween 80 has adjusted the spontaneous flocculating properties of the antigen.

> *Saline control.* Add 1 drop of antigen, using the antigen pipette, to 0.1 ml. of physiological saline on a wax-ringed slide, place on a rotating apparatus (Boerner type) and rotate 100 to 120 times per minute for 15 minutes. If a reaction greater than 2+ is obtained, additional 0.1 ml. amounts of Tween 80 must be added, not to exceed 0.5 ml. or 1.0 ml. in total, until a 2+ or less reading is obtained. In case an antigen does not adjust to these requirements, it should be washed, by centrifugation, several times in distilled water, 4 ml. physiological saline and 0.5 ml. Tween 80 added as before, and again tested against saline for its flocculating properties.
>
> *Negative serum control.* Add 1 drop of antigen, using the antigen pipette, to each 0.1 ml. amount of twofold serial dilutions of a negative serum. The serial dilutions are made in physiological saline and should be the same as those employed for the positive serum in "the test proper." Place on rotating apparatus as before and read at end of 15 minutes. There must be no flocculation in the dilution of the negative control serum corresponding to the highest dilution of the positive serum which gives a 3+ or greater reaction. If an antigen is prepared as outlined and

meets the above requirements, it is ready for use as the test antigen. In the present study the test antigens retained their antigenic properties for as long as 2 months but the stock antigens for a much longer period of time when both were kept at 4° C. It therefore seems better to prepare small amounts of test antigen and to retain the bulk of the antigen as stock antigen.

7. Test the antigen against twofold serial dilutions of a positive serum according to the technique outlined in "the test proper."

*The Test Proper*

1. Prepare 1:5, 1:10, and 1:20 serum dilutions with physiological saline. If desired the twofold serial dilutions may be continued to the endpoint.
2. Pipette 0.1 ml. of each dilution onto a wax-ringed slide by putting the pipette in contact with the slide, delivering the 0.1 ml. amount, and withdrawing. The same pipette is used for all dilutions of the same serum by proceeding from the highest to the lowest.
3. The test antigen, which is kept at 4° C., should be removed from the refrigerator and allowed to reach room temperature before use.
4. With an antigen pipette add one drop of the test antigen to the center of each wax ring containing the diluted serum. Before the antigen is dispensed it should be shaken vigorously to obtain a homogeneous suspension. Each time the antigen is used the shaking procedure should be repeated.
5. Place the slide on a rotating apparatus (Boerner type) and rotate 100 to 120 times per minute for 15 minutes. If necessary the slides can be rotated by hand, but slightly lower titers may be obtained.
6. The flocculation reactions are then read.
7. For each series of tests two controls are used:

   (a) *Negative serum control.* By means of an antigen pipette, add 1 drop of antigen to 0.1 ml. of each of the same serum dilutions as used for the test sera.

   (b) *Saline control.* By means of an antigen pipette add 1 drop of antigen to 0.1 ml. of physiological saline used in the dilution of the sera.

Low-power magnification of the compound microscope is used in reading the reactions. Because of the effect of rotation, the flocs in a positive serum may be concentrated at one side of the wax ring and because of this, it is essential that the entire area of the ring be examined. In a 4+ reaction all of the sensitized particles will be flocculated into separate masses. The flocs themselves may vary in size depending upon the titer of the serum, but, in any case, the fields between the flocs are clear. Approximately three-fourths of the sensitized particles are flocculated in a 3+ reaction, one-half in a 2+ reaction, one-fourth in a 1+ reaction, and none in a negative reaction.

The dispersion of colored particles in a negative serum gives a slight blue haze, but the concentration of the colored particles of the floc in a positive serum gives a very intense blue color which is discernible immediately through the microscope and often macroscopically as well. A serum which gives a 4+ or 3+ reaction is considered positive while a serum which gives a 2+ or 1+ reaction is considered negative.

## Results and Discussion

In order that we might be able to determine the specificity and sensitivity of the flocculation reaction, it was necessary to compare it with some other serological reaction. For some years this laboratory has utilized principally the complement fixation test for the diagnosis of trichinosis because it has been found to give more reliable results than the precipitin test. For the evaluation of the flocculation test, the complement fixation test was, therefore, used as our standard for comparison.

A few of the sera used in the evaluation of the flocculation test for trichinosis were fresh, but the majority had been stored for from 1 to 5 years. The stored sera had been merthiolated and maintained at temperatures of 4° C. during the storage period. Most of the sera were tested when fresh by the complement fixation reaction, and then retested for the present study after the period of storage. The sera used as positive test sera were either from patients with a clinical diagnosis of trichinosis or suspected of having trichinosis. Several of the diagnoses had been confirmed by demonstration of the larvae of *T. spiralis* at biopsy. The negative control sera were from patients found negative by complement fixation for trichinosis and/or amoebiasis.

Part a of the table compares the results of the flocculation and complement fixation reactions obtained on 127 of the sera which were tested after a long period of storage. Twenty-two of the sera were positive by both the flocculation and complement fixation tests, and 74 were negative by both tests. However, 13 were negative by the flocculation test but positive by the complement fixation test, and conversely 18 were positive by flocculation but negative by complement fixation. It should be stated that of these 18 sera 15 were positive by the complement fixation test when the fresh sera were originally tested. This would seem to indicate that these were true positive flocculation reactions. The remaining 3 sera were not tested by complement fixation when the sera were fresh, but only after storage. Since the flocculation tests were performed only on stored sera, results of these tests on fresh sera are not available to explain the 13 sera negative by flocculation but positive by complement fixation. Statistical analysis of the data showed that if it is assumed that the complement fixation test detects antibodies produced in trichi-

nosis, then it can be assumed that the flocculation test also detects these antibodies.

Part b of the table gives a further analysis of the data by comparing the results of flocculation reactions obtained on 109 of the sera, which were tested after a long period of storage, to results of complement fixation reactions on the same sera when fresh. Of 70 sera originally positive by the complement fixation test, 37 were found positive by the flocculation test performed on the sera after a long period of storage. The flocculation test had detected more than 50 percent of the positives. Analysis of the data presented in part c of the table shows that the complement fixation test itself, when similarly compared, was able to detect somewhat less than 50 percent of the positives, 32 of an original 67. Thus, we should not expect the flocculation test to do much better. The discrepancy between the total numbers of original positive sera, 70 and 67, is explained by the fact that 3 of the stored sera, when retested by complement fixation, gave anticomplementary reactions with the result that the data could not be included. The above comparisons show that the flocculation and complement fixation tests compare favorably and that if the complement fixation test detects infection with *T. spiralis*, so does the flocculation test. From part b of the table it is noted that the flocculation reaction on stored sera was never positive when tested against fresh sera that were negative by complement fixation; thus, the flocculation test apparently gave no false positives. Perusal of the data in part c

***Comparison of results of flocculation and complement fixation tests performed on 139 sera*** [1]

PART a. Flocculation and complement fixation reactions obtained on 127 of the sera tested after a long period of storage:

| | | Complement fixation (stored sera) Positive | Complement fixation (stored sera) Negative |
|---|---|---|---|
| Flocculation (stored sera) | *Positive* | 22 | 18 |
| | *Negative* | 13 | 74 |

PART b. Flocculation reactions obtained on 109 of the sera, tested after a long period of storage, compared with results of complement fixation reactions on the same sera when fresh:

| | | Complement fixation (fresh sera) Positive | Complement fixation (fresh sera) Negative |
|---|---|---|---|
| Flocculation (stored sera) | *Positive* | 37 | 0 |
| | *Negative* | 33 | 39 |

PART c. Complement fixation reactions obtained on 97 of the sera tested when fresh and after a long period of storage:

| | | Complement fixation (fresh sera) Positive | Complement fixation (fresh sera) Negative |
|---|---|---|---|
| Complement fixation (stored sera) | *Positive* | 32 | 0 |
| | *Negative* | 35 | 30 |

[1] Because certain tests were not performed and because of anticomplementary reactions in the complement fixation test, the reactions recorded in each of the three parts of the table do not total 139.

similarly shows that complement fixation tests performed on stored sera gave no falsely positive reactions—the tests negative on fresh sera were still negative on the same stored sera.

For purposes of determining the titer, each serum was prepared in twofold serial dilutions to the endpoint. The titers varied from serum dilutions of 1:5 to 1:2560. Approximately half of the positive sera had titers of from 1:5 to 1:40, while the remaining half exhibited titers of 1:80 to 1:2560. Of all the positive sera tested by the flocculation reaction, only two sera of high titer gave zonal reactions. In such cases it is desirous to set up quantitative titrations by continuing the twofold serial dilutions to the endpoint. Usually a weak flocculation reaction will be evident in the lower dilutions of a serum exhibiting zonal tendencies. Merthiolate and phenol, in the amounts used as serum preservatives, have not interfered with the flocculation reaction. Grossly particulate serum may interfere with the reaction; hence, it is advisable to centrifuge each serum immediately before use. The anticomplementary tendencies of chylous serum makes such serum unsatisfactory in the complement fixation reaction. It has been our experience that chylous serum can be used in the flocculation test since it does not interfere with this reaction. Both inactivated and uninactivated serum were found satisfactory.

The present data do not indicate a superiority of the flocculation test over the complement fixation test, but if they are equally as sensitive and specific, the outstanding advantages of the former should make it the test of choice. With the flocculation test, results can be obtained in a matter of minutes and its performance does not require highly trained personnel. It seems likely that the antigen can be prepared commercially, and, if so, it will be possible for almost any laboratory, regardless of size, to perform the test. It is our impression that the flocculation test may prove more sensitive than the complement fixation test. However, a large series of tests on fresh sera, using both techniques, must be performed to prove or disprove this impression.

In regard to the use of the flocculation test for other diseases, preliminary studies indicate that it may be applied to the diagnosis of brucellosis, tularemia, and certain parasitic diseases besides trichinosis.

## Summary and Conclusions

1. A rapid flocculation test for the diagnosis of trichinosis is described in detail.

2. Comparison of the flocculation test with the complement fixation test indicated that they were equally sensitive and apparently gave no falsely positive reactions.

3. The flocculation test has several outstanding advantages in-

cluding the rapidity with which it can be performed and the fact that highly trained personnel are not required.

4. In our hands, the antigen has remained stable for months and if it can be prepared commercially, the flocculation test for trichinosis should be a valuable diagnostic aid to both the large and small laboratory.


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# Incidence of Disease

*No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring*

## UNITED STATES

### Reports From States for Week Ended June 2, 1951

For the current week 116 cases of poliomyelitis were reported as compared with 133 for the same week in 1950, and 156 in 1949. States reporting 5 or more cases for the current week were: California, 25; Texas, 22; Florida, 9; Georgia, 8; and Alabama, 5. Four of these are southern States in which the seasonal upswing would be expected to appear earlier than in northern areas.

Rocky Mountain spotted fever cases were fewer for the current week, 15, compared with the same week last year when 23 were reported.

Twelve cases of infectious hepatitis were reported, six in New York State, and two each in Florida, Ohio, and Utah. Wyoming reported one case of Colorado tick fever.

#### Epidemiological Reports

*Streptococcal Sore Throat*

Dr. Donovan, District Health Officer, Geneva, N. Y., has reported an outbreak of streptococcal sore throat in a Veterans Hospital in the central part of the State. About 150 cases occurred in a 3-day period, May 26 to 28. The illnesses were mild and all cases have recovered. The suspected source of infection was a food handler who had a sore throat just before the outbreak occurred. Another food handler had a positive throat culture.

*Rabies*

Dr. A. S. McCown, Virginia Department of Health, reports a very marked decline in the incidence of animal rabies in three adjoining counties, Pittsylvania, Halifax, and Mecklenburg, located in the southern part of the State. The decline took place subsequent to antirabies vaccination and suppression of stray dogs. In 1947, there were 78 cases of rabies in animals in these three counties which were confirmed by laboratory examination. In 1948, there were 70 rabid animals. Rabies control activities, including vaccination, were instituted in September 1948 in one county and 2 months later

in the other two. In 1949, only 3 cases of animal rabies were reported in the three counties; 2 were reported in 1950, and none from January 1 to May 26, 1951.

The first case of human rabies to be discovered in Up-State New York since 1945 occurred recently in a 15-year-old boy residing in the vicinity of Coxsackie. The diagnosis was not definitely suspected until autopsy. A family dog is suspected of being the source of infection. The boy lived in an area where animal rabies incidence is relatively high, especially among foxes.

*Gastroenteritis*

Dr. Burke Diefendorf, District Health Officer, Glen Falls, N. Y., has reported an outbreak of *Staphylococcus aureus* enterotoxin food poisoning affecting school children in northeastern New York. Of 168 pupils and 7 teachers eating in the cafeteria lunch room, 59 pupils and 2 teachers became ill May 18, 3½ hours afterward. There was sudden onset with nausea, with vomiting in some, and mild diarrhea in a few. Potato salad was the suspected vehicle since all of those who became ill ate it. A total of 146 persons ate the salad. It had been prepared at 9 a. m. and remained at room temperature until noon. The laboratory examination of a left-over sample revealed the presence of *S. aureus*, *Streptococcus fecalis*, *B. coli*, and certain other organisms.

Dr. J. C. Hart, Connecticut Department of Health, reports two outbreaks of gastroenteritis occurring in two groups of persons who attended banquets on the same day in the same restaurant. They were served the same menu. In one group of 97 persons, 80 became ill, and in the other group of 22, there were 14 who were affected. Diarrhea, abdominal pain, and vomiting occurred after an incubation period of 8 to 16 hours. The suspected vehicle of infection was roast chicken with gravy.

*Intestinal Parasites*

Dr. J. C. Hart reports that routine stool examinations have been made by the State Bureau of Laboratories on Jamaicans employed as seasonal laborers on tobacco plantations of the State. Four such persons have carried cysts of *Endamoeba histolytica* and 10 had ova of *Necator americanus*. These were found over a period of 3 months.

*Influenza*

Dr. J. A. Pons, Puerto Rico Commissioner of Health, has reported a gradually increasing incidence of influenza during the past 2 months, which is now assuming epidemic proportions on the island. A total of 7,098 cases was reported for the week ended May 26 compared with 2,090 and 491 for the previous 2 weeks, respectively. The disease has been mild with a low mortality. Specimens have been obtained for isolation of virus.

*Serum Hepatitis*

It has been reported that 14 cases of serum hepatitis occurred in Portland, Maine, during the past 10 months in persons who had received thrombin of human origin. The illness was found in Boston in another group of persons who had been treated with the same product. The incubation periods in the Portland group varied from 90 to 105 days. Thrombin of human origin has been recalled from all distributing centers and consignees.

*Infectious Hepatitis*

Dr. W. L. Halverson, California Director of Health, has reported four cases with one death of infectious hepatitis in an institution located in Los Angeles County. The disease occurred to a dentist, an attendant, and two patients. Investigation revealed that the dentist had the infection several months ago. The onset of disease in the attendant was March 1, and in one patient on March 2. The diagnosis was made post mortem, following an examination on March 22 in the other patient.

***Comparative Data for Cases of Specified Reportable Diseases: United States***

[Numbers after diseases are International List numbers, 1948 revision]

| Disease | Total for week ended— | | 5-year median 1946-50 | Seasonal low week | Cumulative total since seasonal low week | | 5-year median 1945-46 through 1949-50 | Cumulative total for calendar year— | | 5-year median 1946-50 |
|---|---|---|---|---|---|---|---|---|---|---|
| | June 2, 1951 | June 3, 1950 | | | 1950-51 | 1949-50 | | 1951 | 1950 | |
| Anthrax (062) | ------ | ------ | ------ | (1) | (1) | (1) | (1) | 36 | 18 | 23 |
| Diphtheria (055) | 62 | 75 | 158 | 27th | 4,674 | 7,088 | 10,432 | 1,767 | 2,817 | 4,074 |
| Encephalitis, acute infectious (082) | 20 | 9 | 9 | (1) | (1) | (1) | (1) | 370 | 283 | 194 |
| Influenza (480-483) | 529 | 946 | 495 | 30th | 127,748 | 146,984 | 146,984 | 113,206 | 136,400 | 126,343 |
| Measles (085) | 18,894 | 13,061 | 17,967 | 35th | 411,968 | 230,426 | 478,392 | 383,267 | 220,297 | 443,446 |
| Meningitis, meningococcal (057.0) | 79 | 72 | 58 | 37th | 3,153 | 2,898 | 2,854 | 2,192 | 1,984 | 1,882 |
| Pneumonia (490-493) | 1,122 | 1,163 | (2) | (1) | (1) | (1) | (1) | [3] 39,246 | 50,732 | (2) |
| Poliomyelitis, acute (080) | 116 | 133 | 144 | 11th | [4] 762 | 880 | 860 | [4] 1,974 | 2,011 | 1,226 |
| Rocky Mountain spotted fever (104) | 15 | 23 | 23 | (1) | (1) | (1) | (1) | 62 | 76 | 88 |
| Scarlet fever (050) [5] | 1,379 | 1,015 | 1,513 | 32d | 62,748 | 51,963 | 75,549 | 47,057 | 35,524 | 53,005 |
| Smallpox (084) | ---- | 1 | 1 | 35th | 13 | 42 | 66 | 5 | 22 | 45 |
| Tularemia (059) | 9 | 13 | 25 | (1) | (1) | (1) | (1) | [6] 299 | 434 | 434 |
| Typhoid and paratyphoid fever (040, 041) [7] | 46 | 84 | 61 | 11th | [8] 463 | 604 | 604 | [8] 898 | 1,114 | 1,114 |
| Whooping cough (056) | 1,457 | 2,481 | 2,079 | 39th | 55,340 | 79,886 | 76,130 | 33,738 | 58,350 | 44,864 |

[1] Not computed. [2] Data not available. [3] Additions for week ended May 26—Pennsylvania, 30 cases; West Virginia, 7; Georgia, 14; week ended May 19, Tennessee, 27. [4] Deductions: Georgia, 1 case each for weeks ended May 12 and May 26. [5] Including cases reported as streptococcal sore throat. [6] Deduction: Arkansas, week ended May 5, 1 case. [7] Including cases reported as salmonellosis. [8] Deduction: North Carolina, week ended May 19, 1 case.

## Reported Cases of Selected Communicable Diseases: United States, Week Ended June 2, 1951

[Numbers under diseases are International List numbers, 1948 revision]

| Area | Diphtheria (055) | Encephalitis, infectious (082) | Influenza (480-483) | Measles (085) | Meningitis, meningococcal (057.0) | Pneumonia (490-493) | Poliomyelitis (080) |
|---|---|---|---|---|---|---|---|
| **United States** | **62** | **20** | **529** | **18,894** | **79** | **1,122** | **116** |
| **New England** | **5** | **1** | **3** | **987** | **5** | **14** | |
| Maine | 1 | | 1 | 35 | 2 | 4 | |
| New Hampshire | | | | 36 | | | |
| Vermont | | | | 101 | | | |
| Massachusetts | 3 | 1 | | 543 | | | |
| Rhode Island | | | | 23 | | | |
| Connecticut | 1 | | 2 | 249 | 3 | 10 | |
| **Middle Atlantic** | **11** | **7** | **7** | **3,919** | **10** | **130** | **7** |
| New York | 4 | 5 | [1] 4 | 1,820 | 8 | 33 | 4 |
| New Jersey | | 1 | 3 | 915 | | 48 | 2 |
| Pennsylvania | 7 | 1 | | 1,151 | 2 | 49 | 1 |
| **East North Central** | **7** | **6** | **4** | **3,884** | **11** | **88** | **11** |
| Ohio | 1 | | | 650 | 4 | | |
| Indiana | 5 | | 4 | 82 | | 14 | 1 |
| Illinois | | 1 | | 670 | 3 | 45 | 3 |
| Michigan | 1 | 3 | | 502 | 1 | 29 | 3 |
| Wisconsin | | 2 | | 1,980 | 3 | | 4 |
| **West North Central** | **4** | | **14** | **1,116** | **4** | **88** | **4** |
| Minnesota | 2 | | | 112 | | 6 | |
| Iowa | | | | 221 | | | 1 |
| Missouri | | | 2 | 225 | 1 | 3 | |
| North Dakota | 1 | | 12 | 161 | 1 | 71 | |
| South Dakota | | | | 12 | | | |
| Nebraska | | | | 5 | | | 3 |
| Kansas | 1 | | | 377 | 2 | 8 | |
| **South Atlantic** | **13** | | **222** | **1 574** | **11** | **360** | **24** |
| Delaware | | | | 37 | | | |
| Maryland | | | 1 | 207 | | 20 | |
| District of Columbia | | | | 51 | | 3 | |
| Virginia | | | 121 | 639 | 2 | 25 | 1 |
| West Virginia | 1 | | | 290 | 6 | | |
| North Carolina | 6 | | | 39 | 2 | | 4 |
| South Carolina | 3 | | 9 | 35 | | 3 | 2 |
| Georgia | 3 | | 91 | 127 | 1 | 309 | 8 |
| Florida | | | | 89 | | | 9 |
| **East South Central** | **8** | | **18** | **580** | **12** | **74** | **6** |
| Kentucky | 1 | | 3 | 216 | 5 | 20 | 1 |
| Tennessee | 1 | | 13 | 123 | 1 | | |
| Alabama | 5 | | | 220 | 3 | 34 | 5 |
| Mississippi | 1 | | 2 | 21 | 3 | 20 | |
| **West South Central** | **7** | **1** | **133** | **2,238** | **19** | **278** | **30** |
| Arkansas | | | 76 | 201 | 3 | 36 | 2 |
| Louisiana | 1 | | | 73 | 1 | 25 | 4 |
| Oklahoma | | | 57 | 444 | | 24 | 2 |
| Texas | 6 | 1 | | 1,520 | 15 | 193 | 22 |
| **Mountain** | **3** | **1** | **86** | **815** | | **36** | **6** |
| Montana | | | 13 | 96 | | | |
| Idaho | | | | 116 | | | |
| Wyoming | | | | 39 | | 2 | |
| Colorado | | | 3 | 159 | | 16 | 3 |
| New Mexico | 2 | | | 86 | | 5 | |
| Arizona | 1 | 1 | 70 | 231 | | 13 | 3 |
| Utah | | | | 84 | | | |
| Nevada | | | | 4 | | | |
| **Pacific** | **4** | **4** | **42** | **3,781** | **7** | **54** | **28** |
| Washington | | | 18 | 569 | 1 | 2 | 2 |
| Oregon | 1 | | 13 | 536 | 1 | 27 | 1 |
| California | 3 | 4 | 11 | 2,676 | 5 | 25 | 25 |
| Alaska | | | 16 | | | | |
| Hawaii | | | | 20 | | | |

[1] New York City only.

## Reported Cases of Selected Communicable Diseases: United States, Week Ended June 2, 1951—Continued

[Numbers under diseases are International List numbers, 1948 revision]

| Area | Rocky Mountain spotted fever (104) | Scarlet fever (050) | Smallpox (084) | Tularemia (059) | Typhoid and paratyphoid fever [1] (010, 011) | Whooping cough (056) | Rabies in animals |
|---|---|---|---|---|---|---|---|
| **United States** | 15 | 1,379 | | 9 | 46 | 1,457 | 153 |
| **New England** | | 150 | | | 5 | 74 | |
| Maine | | 18 | | | | 14 | |
| New Hampshire | | [2] 9 | | | | 6 | |
| Vermont | | 6 | | | | 3 | |
| Massachusetts | | 99 | | | 5 | 26 | |
| Rhode Island | | 3 | | | | 8 | |
| Connecticut | | 15 | | | | 17 | |
| **Middle Atlantic** | 2 | 371 | | | 7 | 110 | 9 |
| New York | | [2] 265 | | | 4 | 53 | 7 |
| New Jersey | 2 | 22 | | | | 33 | |
| Pennsylvania | | 81 | | | 3 | 24 | 2 |
| **East North Central** | 1 | 385 | | | 2 | 195 | 24 |
| Ohio | | 104 | | | 1 | 38 | 5 |
| Indiana | 1 | 15 | | | | 11 | 11 |
| Illinois | | 46 | | | | 29 | 1 |
| Michigan | | 182 | | | 1 | 66 | 7 |
| Wisconsin | | 38 | | | | 51 | |
| **West North Central** | 1 | 63 | | 1 | | 71 | 38 |
| Minnesota | 1 | 16 | | | | 8 | 3 |
| Iowa | | 9 | | | | 16 | 17 |
| Missouri | | 16 | | 1 | | 7 | 17 |
| North Dakota | | 1 | | | | 11 | |
| South Dakota | | 3 | | | | 1 | |
| Nebraska | | 1 | | | | | |
| Kansas | | 11 | | | | 25 | 1 |
| **South Atlantic** | 6 | 72 | | 1 | 16 | 166 | 21 |
| Delaware | | 2 | | | | 1 | |
| Maryland | 2 | 22 | | | 1 | 6 | |
| District of Columbia | | 6 | | | | 8 | |
| Virginia | 1 | 6 | | | 1 | 72 | 1 |
| West Virginia | 1 | 12 | | | | | 1 |
| North Carolina | 2 | 19 | | | 1 | 29 | |
| South Carolina | | | | | 1 | 3 | 11 |
| Georgia | | 3 | | 1 | 12 | 20 | 8 |
| Florida | | [2] 2 | | | | 18 | |
| **East South Central** | 1 | 34 | | | 2 | 101 | 19 |
| Kentucky | | 19 | | | 1 | 22 | 5 |
| Tennessee | 1 | 10 | | | 1 | 10 | 6 |
| Alabama | | 1 | | | | 11 | 7 |
| Mississippi | | 1 | | | | 28 | 1 |
| **West South Central** | 1 | 45 | | 6 | 5 | 531 | 33 |
| Arkansas | | 2 | | 2 | 1 | 52 | 5 |
| Louisiana | | 5 | | | 2 | 6 | |
| Oklahoma | 1 | 9 | | 1 | | 30 | 1 |
| Texas | | 29 | | 3 | 2 | 443 | 27 |
| **Mountain** | 3 | 32 | | | 4 | 127 | 9 |
| Montana | | 2 | | | | 7 | |
| Idaho | 2 | 8 | | | 1 | 5 | |
| Wyoming | 1 | | | | 1 | 2 | 9 |
| Colorado | | 5 | | | 1 | 28 | |
| New Mexico | | 1 | | | 1 | 14 | |
| Arizona | | 4 | | | | 62 | |
| Utah | | [2] 12 | | | | 8 | |
| Nevada | | | | | | 1 | |
| **Pacific** | | 227 | | 1 | 5 | 83 | |
| Washington | | 21 | | | | 24 | |
| Oregon | | 10 | | | 1 | 8 | |
| California | | [2] 193 | | 1 | 4 | 50 | |
| Alaska | | | | | | | |
| Hawaii | | | | | 1 | | |

[1] Including cases reported as salmonellosis. [2] Including cases reported as streptococcal sore throat.

# FOREIGN REPORTS

## CANADA

*Reported Cases of Certain Diseases—Week Ended May 12, 1951*

| Disease | Total | New-foundland | Prince Edward Island | Nova Scotia | New Brunswick | Quebec | Ontario | Manitoba | Saskatchewan | Alberta | British Columbia |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Chickenpox | 1,144 | | | 30 | | 216 | 582 | 46 | 45 | 82 | 143 |
| Diphtheria | 2 | | | | | 2 | | | | | |
| Dysentery: | | | | | | | | | | | |
| Amebic | 2 | | | | | | | | | 2 | |
| Bacillary | 7 | | | | | | 2 | | | | 5 |
| German measles | 393 | 2 | | 1 | | 61 | 175 | 3 | 22 | 40 | 86 |
| Influenza | 37 | | | 16 | 6 | | 2 | 10 | | | 3 |
| Measles | 1,519 | 1 | | 95 | 6 | 416 | 553 | 79 | 12 | 241 | 116 |
| Meningitis, meningococcal | 2 | | | | 1 | | 1 | | | | |
| Mumps | 772 | 1 | | 20 | 1 | 251 | 250 | 20 | 35 | 75 | 119 |
| Scarlet fever | 302 | | | 1 | 3 | 86 | 46 | 34 | 17 | 46 | 69 |
| Tuberculosis (all forms) | 259 | 10 | | 1 | 14 | 79 | 33 | 58 | 14 | 16 | 34 |
| Typhoid and paratyphoid fever | 9 | | | | | 5 | | | | | 4 |
| Venereal diseases: | | | | | | | | | | | |
| Gonorrhea | 266 | 5 | | 6 | 9 | 62 | 45 | 21 | 17 | 34 | 67 |
| Syphilis | 90 | | | 3 | 4 | 35 | 20 | 7 | 6 | 6 | 9 |
| Primary | 7 | | | | | 4 | 3 | | | | |
| Secondary | 2 | | | 1 | | 1 | | | | | |
| Other | 81 | | | 2 | 4 | 30 | 17 | 7 | 6 | 6 | 9 |
| Whooping cough | 173 | 1 | | | | 42 | 85 | 12 | | 16 | 17 |

## NORWAY

*Reported Cases of Certain Diseases—March 1951*

| Disease | Cases | Disease | Cases |
|---|---|---|---|
| Diphtheria | 20 | Pneumonia (all forms) | 2,986 |
| Dysentery, unspecified | 3 | Poliomyelitis | 17 |
| Encephalitis, infectious | 1 | Rheumatic fever | 101 |
| Erysipelas | 273 | Scabies | 688 |
| Gastroenteritis | 2,388 | Scarlet fever | 140 |
| Hepatitis, infectious | 65 | Tuberculosis (all forms) | 304 |
| Impetigo contagiosa | 1,426 | Venereal diseases: | |
| Influenza | 3,085 | Gonorrhea | 145 |
| Malaria | 2 | Syphilis | 51 |
| Measles | 2,933 | Other forms | 8 |
| Meningitis, meningococcal | 12 | Weils disease | 2 |
| Mumps | 102 | Whooping cough | 1 |

## NEW ZEALAND

*Reported Cases of Certain Diseases and Deaths—4 Weeks Ended Apr. 28, 1951*

| Disease | Cases | Deaths | Disease | Cases | Deaths |
|---|---|---|---|---|---|
| Actinomycosis | 1 | | Malaria | 3 | |
| Brucellosis | 5 | | Meningitis, meningococcal | 8 | 1 |
| Diphtheria | 11 | 1 | Poliomyelitis | 7 | 1 |
| Dysentery: | | | Puerperal fever | 1 | |
| Amebic | 8 | | Scarlet fever | 92 | |
| Bacillary | 18 | | Tetanus | 3 | 1 |
| Encephalitis, infectious | 3 | | Trachoma | 1 | |
| Erysipelas | 14 | | Tuberculosis (all forms) | 143 | 30 |
| Food poisoning | 16 | | Typhoid fever | 6 | |
| Influenza | 2 | | | | |

## REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

The following reports include only items of unusual incidence or of special interest and the occurrence of these diseases, except yellow fever, in localities which had not recently reported cases. All reports of yellow fever are published currently. A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

### Plague

*Belgian Congo.* During the period May 24–29, 1951, plague was reported in Stanleyville Province as follows: Muhono one case, Langbe three, and Bunyo one.

*Indochina.* For the week ended May 19, 1951, seven cases of plague were reported in Cambodia.

### Smallpox

*Belgian Congo.* During the week ended May 19, 1951, 82 cases of smallpox were reported as compared with 60 for the previous week.

*British East Africa.* An increase has been noted in the incidence of smallpox in Tanganyika, from 3 cases for the week ended April 7, 1951, the number rose to 17 for the following week.

*Cameroon (French).* During the period May 1–10, 1951, 32 cases of smallpox were reported compared with 12 for the previous 10-day period.

*Ceylon.* The recent outbreak of smallpox in Ceylon has subsided with only 3 cases being reported for the week ended May 26, 1951, compared with 26 for the previous week.

*Ethiopia.* Three cases of smallpox were reported for the week ended April 21, 1951. These are the first cases since the week ended January 13, when one case was reported.

*Indochina.* The incidence of smallpox in two ports of Vietnam for the week ended May 26, 1951, decreased to about half the number reported for the previous week. In Haiphong the number of cases decreased from 105 to 52 and in Hanoi, from 77 to 44.

*Netherlands.* During the week ended May 19, 1951, two cases of smallpox were reported in Tilburg where the recent outbreak occurred.

### Typhus Fever

*Afghanistan.* During the month of April 1951, 111 cases of typhus fever were reported in Afghanistan.

*Egypt.* One case of typhus fever was reported in Cairo for the week ended May 19, 1951.

*Eritrea.* Three cases of typhus fever were reported in Eritrea for the week ended May 19, 1951.

*Turkey.* During the week ended May 26, 1951, seven cases of typhus fever were reported compared with five for the previous week.

**Yellow Fever**

*Brazil.* In connection with the recent outbreak of jungle yellow fever in Goiaz State confirmed deaths were reported in counties as follows: Goiaz, March 20, one case; and Jaragua, Mardh 24, one.

*Ecuador.* One confirmed death, pertaining to the recent outbreak of jungle yellow fever, was reported on April 26, 1951, in Esmeraldas Province, District of Aguas Frias.

*Gold Coast.* During the period February 25–March 1, 1951, two cases (one death) of yellow fever were reported in Akwatia. Both patients were admitted to the hospital at Kade.

+ + +

The printing of this publication has been approved by the Director of the Bureau of the Budget (August 10, 1949).

The PUBLIC HEALTH REPORTS, first published in 1878 under authority of an act of Congress of April 29 of that year, is issued weekly by the Public Health Service through the Division of Public Health Methods, pursuant to the following authority of law: United States Code, title 42, sections 241, 245, 247; title 44, section 220.

It contains (1) current information regarding the incidence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

The PUBLIC HEALTH REPORTS is published primarily for distribution, in accordance with the law, to health officers, members of boards or departments of health, and other persons directly or indirectly engaged in public health work. Articles of special interest are issued as reprints or as supplements, in which forms they are made available for more economical and general distribution.

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# Public Health Reports

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FEDERAL SECURITY AGENCY

PUBLIC HEALTH SERVICE

FEDERAL SECURITY AGENCY
*Oscar R. Ewing, Administrator*

PUBLIC HEALTH SERVICE
*Leonard A. Scheele, Surgeon General*

Division of Public Health Methods
*G. St. J. Perrott, Chief of Division*

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# Public Health Reports

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## The Challenge to Voluntary Health Agencies

The Nation's voluntary health agencies, convening in the thirty-first annual meeting of the National Health Council in New York, April 6, 1951, reexamined their programs in light of ever-growing problems of defense mobilization.

Throughout the discussions by representatives of 36 member agencies of the Council and several hundred others active in public health and related fields ran comments indicating deep concern over two current threats to the health security of the Nation: First, an awareness that in many quarters there exist feelings of apathy as to the seriousness of the civil defense situation and confusion as to what needs to be done; and, second, an alertness to the steadily increasing problems of maintaining what they consider to be "adequate" health services in the face of professional personnel losses and increasing needs for community health services.

Well-informed, inspired, untiring leadership is a prime necessity at all levels of health service was the consensus—a leadership which can promote teamwork, maintain and make the most of professional manpower and health resources, meet the growing mobilization needs, and build an understanding and appreciation of the basic values and practical advantages of good public health services in every community in times of war and peace.

### Report to Member Agencies

Presenting the record of the National Health Council's thirty-first year, Dr. Thomas D. Dublin, executive director, held that the Council is peculiarly geared for the tasks ahead in mobilization. The Council has available to it, the report pointed out, a network of channels extending into every community of the Nation—an estimated 20,000 local and State affiliates of member agencies. The report indicated that the Council's mission was one of leadership of this wealth of potential interest. Specificially, it urged Council

Through the courtesy of Dr. Thomas D. Dublin, executive director of the Council, this summary has been prepared cooperatively by the staff of the National Health Council and of PUBLIC HEALTH REPORTS. While statements have been drastically edited in the interests of space and time, insofar as possible the speakers' own words have been used in both direct and indirect quotation form.

members to consider how to "inspire their State and local affiliates to participate more actively in community organization for total health protection."

"Most voluntary health agencies are seeking to fit their own resources and programs into already formulated defense programs," Dr. Dublin read from the report. "An increasingly active role in the long-range planning to which an extended crisis may lead should be worked out with defense agencies. Redoubled efforts by our member organizations should be made to work out current problems in unity."

[On this point, Mefford R. Runyon, of the American Cancer Society, later suggested that cooperation by voluntary agencies be worked out on the local level where it can become part of an integrated community plan rather than to try to work out a plan for local affiliates on a national level.]

"A quick solution of the conflicts in which the Nation is now involved will not modify the immediate and long-range goals of the health movement," the report continued. "There is too much to be done before even minimum standards are achieved at home and abroad to justify slackened efforts."

To the possible argument that the Nation should now concentrate on seemingly more immediate tasks, the report indicated that the national health is always an immediate task and an important goal in itself, immediate as well as long range.

### *Citizen Interest*

"Citizen interest in expanded health programs is at an all time high," according to the Council report. "Voluntary agencies are enlisting mounting public support. Lay organizations—parent-teachers associations, service clubs, women's organizations, and farm and labor groups—sponsor health programs. New State and local health councils are springing up. Public and private sources are contributing larger sums to health and welfare. Never was so much health legislation introduced as in the period since World War II.

"Even on the international level there are similar manifestations. Cooperation between nations on health matters, hitherto episodic and in response chiefly to actual or imminent disaster, has been

strengthened through the World Health Organization. Postwar governments, responding to public demand, are expanding health programs. A relentless war on disease is part of the Point IV program for raising the economic level of underdeveloped areas," the report noted.

"These signs clearly show that personal and public health are, at long last, achieving the status of a major human goal—comparable to economic security and political freedom. In fact, there is growing realization that they are inseparable. The public demand for expanded health programs is matched by official recognition of the importance of such programs in the struggle for universal democracy and a peaceful world," the report stated.

### *Leadership and Joint Programs*

The time has come, the Council report stated, for member agencies of the National Health Council to consider:

- How they can unite their leadership more firmly, and act more effectively together in the broad fields where they now act individually.
- How they can inspire their State and local affiliates to participate more actively in community organization for total health protection.
- How they can utilize more fully the services available through their Council for the strengthening of the entire health movement.
- How they can establish closer working relations with agencies in the social welfare, economic, and political fields.

"The stage is set," the report continued. "The Council has become representative of the leading organizations in the health field. It provides the necessary mechanism for coordination of the drive for community health organization. It is gaining recognition as a national clearing house for information on health problems. It is being called upon, more and more, to act as a spokesman for the health movement."

The report cited numerous instances of the willingness and ability of member agencies of the Council to work jointly on important projects.

### *Developing Local Units*

The report recalled that 3 years ago the Council was entrusted by its member agencies—and by the 63 national citizens' organizations represented on its National Advisory Committee on Local Health Units—with the task of providing the necessary leadership for one of the Nation's major health programs: that of promoting well-organized health services in every community throughout the Nation.

The Council's role in this program has been primarily that of leader and stimulator. It acts as a clearing house of information, as a counselor and guide. One channel for promoting activity on State and

local levels has been the series of regional conferences organized by the Advisory Committee which bring together community leaders, including representatives of member agencies' local affiliates. The fifth and most recent of these conferences was held in New Jersey in January 1951.

Progress also has been made in the promotion of local and State community health planning councils, the report showed. In 1949-50 the Council conducted a Nation-wide inventory of health councils. The survey revealed the impressive extent of popular interest in cooperative planning for health at every level of community structure. Today, 32 States and 1,190 local health-planning bodies [1] are in operation. The inventory is being followed by an analysis of structure, operation, support, and accomplishment.

"Community organization for health is one of the most dynamic elements in the national health scene," the report said. "There is a wealth of hidden resources, human and material, in American communities which we have only begun to tap. Community organizations—for health, for welfare, for political, social, and other objectives—are springing up rapidly."

Through their State and local affiliates, the report continued, member agencies, too, have a ready-made mechanism for strengthening their ties with community groups. Agencies which encourage their local affiliates to help initiate and participate in citizen health councils are not only assisting communities to realize their full potential but are helping to speed the success of the individual agency programs.

The organization and operation of a United States Citizen Committee for the World Health Organization is one of several new activities currently being explored or developed by the National Health Council. This Committee would be a voluntary nongovernmental body designed to: (*a*) enlist and maintain in its membership an intelligent and energetic interest in WHO work; (*b*) build public understanding and support in the United States for WHO; (*c*) provide a supplementary means for members of the United States delegations to WHO to inform the American public, and a means for United States citizens to express their opinions to the members of the delegations; and (*d*) undertake specific WHO projects approved by the United States.

Other proposed activities include a study of recruitment and training of health personnel with particular reference to the role of the Council's member agencies in solving increasingly critical shortages, and appraising the relationships of the Council with the national coordinating agencies in the fields of social welfare and adult education.

[1] Listed in Directory of Community Health Planning Councils—1950.

## Symposium for Defense[2]

*Lull . . . The Physician and Medical Personnel*

Relatively equal distribution of medical care—in the armed services and in the civilian population—was the goal of the Council on National Emergency Medical Services when it was set up 2 years ago by the American Medical Association, Dr. George F. Lull, secretary and general manager of AMA, told the NHC meeting.

In certain types of attack, he said, medical personnel and facilities in the attacked zone will be useless and medical service and care will have to come from the outside—the periphery. Use will be made of medical personnel living outside highly industrialized or strategically important areas, and they must be considered in civil defense planning.

The AMA's emergency committee is now a permanent body which feels that it is incumbent on the medical profession to exert a certain amount of leadership in the civil defense programs. The AMA has urged that medical service committees be started in each State and county.

Training of undergraduate and graduate physicians should be coordinated with military and Federal plans for national defense, he said.

*McGinnes . . . Red Cross Program*

Some of the civil defense responsibilities assumed by the American Red Cross were outlined by Dr. G. Foard McGinnes, vice president for health services of that organization.

The Red Cross, he said, has agreed to the following:

- To aid in preparing a first aid manual and in training civil defense workers.
- To assist in training hundreds of thousands in home care of the sick and injured and as nurses' aides.
- To help in providing food, clothing, and temporary shelter on a mass-scale basis during an immediate emergency period.

Dr. McGinnes suggested that the member agencies could assist the Red Cross in carrying out its responsibilities:

- By making their membership aware of the role of the Red Cross in civil defense.
- By publicizing the Red Cross program in their national publications.
- By urging staff members to participate in the various training programs not only for their own survival benefit but also to be able to assist in their communities in the event of attack.
- By establishing agreements on phases of the program which are

[2] Proceedings available on request from National Health Council, 1790 Broadway, New York City 19, N. Y.

of mutual interest, thereby ensuring maximum effectiveness of all community resources.

Dr. McGinnes declared that working agreements have already been set up with the American Medical Association, the American Hospital Association, the National Infantile Paralysis Foundation, and with a number of other agencies, including the Public Health Service and the Children's Bureau. An agreement with the National Tuberculosis Association is being worked out.

Dr. McGinnes urged voluntary agencies to keep informed of civil defense developments, establish a close relationship with local civil defense authorities, encourage staff members to serve on civil defense committees, and offer civil defense authorities the use of physical resources such as buildings, equipment, and motor transportation.

### *Kogel . . . New York City Mobilizes*

New York City's medical emergency program was established in a minimum of time because of the close association of voluntary health agencies with the Medical Emergency Division of the city's Office of Civilian Defense, Dr. Marcus D. Kogel, director of the division and commissioner of hospitals, said in outlining the steps taken in the Nation's largest metropolis. He stated:

- Major credit will go to the voluntary health and hospital agencies if New York City is successful in perfecting an organization that can cope with disaster of the magnitude which must be expected and planned for.
- The Department of Hospitals, assigned the task of organizing the emergency mobilization, called upon the Department of Health for assistance (just as the latter called on the Department of Hospitals for aid in certain phases of public health emergency measures).
- From the beginning traditional administrative boundaries were eliminated and all available talents and skills united in an integrated effort. Voluntary agencies, in much the same spirit, offered immediate and wholehearted cooperation.

Hospital facilities are the most urgent need in the program, Dr. Kogel asserted. An estimated minimum total of 100,000 seriously injured persons may need hospital care after an enemy attack. The city has a peacetime complement of about 50,000 beds, most of which are occupied. To bridge the gap, Dr. Kogel stated, the following measures are being considered:

- Discharge, after disaster, major fractions of the regular hospital population, particularly the chronically ill, to free beds for the more seriously injured.
- Extend to the maximum the bed complement of each hospital, including the use of improvised facilities.

- Organize out-of-town and periphery facilities for overflow of injured.

Providing definitive care to a minimum of 100,000 seriously injured, over and above the normal sick and accident load of New York City, calls for an army of volunteers, Dr. Kogel declared. In addition, he said, there is the problem of offering emergency care at the scene of the disaster prior to removal to hospitals.

- Voluntary agencies highly skilled in recruitment of volunteers are assisting in enlisting the 800,000 volunteers needed for the program.
- In addition, since ambulances cannot be relied upon to get up to scenes of disaster, 150 litter bearers and staffs for each of 400 first-aid stations must be recruited and trained.
- The feasibility of evacuation of children from areas that might be bombed is being considered by the evacuation service of the city's defense office.
- Despite all that is being done there is still apathy—interest of the public varies with the news from Korea.

### *McIver . . . Meeting the Nurse Shortage*

Three premises are guiding the mobilization of nurses for national security, Pearl McIver, R. N., chairman of the Joint Committee on Nursing in National Security, stated.

- Military needs must be met.
- Civilians may be on the battle front, too, if there is full-scale war, so it is equally important to keep up civilian-defense needs.
- Regulation of personnel, either governmental or voluntary, will be required in the event of total mobilization.

The six national nursing organizations participated in the study of the need for nurses in the several fields of nursing, Miss McIver reported. About 384,000 nurses are needed for the civilian defense program, exclusive of additions for the armed services. There are 316,000 professional registered nurses actively employed now. To meet the shortages, she said the following steps are being considered:

- Returning to duty, when possible, those nurses who have become inactive.
- Training of additional practical nurses and other auxiliary workers.
- Recruitment of student nurses in all categories.
- Encouragement of postgraduate and graduate schools to bridge the shortages of teachers, supervisors, and administrators.
- Improvement of nursing service administration to the point that nurses are engaged only in their skills and others perform the work that does not require nurse's training.
- Improvement of personnel policies.


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If large potential war target communities are to survive, there must be assurance of the uninterrupted operation of health measures which, until now, have been taken for granted and which in time of enemy attack become defense measures.

Need to "iterate and reiterate" this fact was urged upon public health leaders by Dr. Harry S. Mustard, chairman of the Committee on the Public Health Defense Program, American Public Health Association. All citizens should be apprised, he said, that modern warfare can completely offset and upset, temporarily at least, the protections which they take for granted and leave them quite vulnerable to the old-fashioned types of epidemic and disaster. The speaker noted that APHA has taken the following steps:[3]

- Developed, at the request of the National Security Resources Board, rosters of persons trained in the various specialties in the fields of preventive medicine and public health.
- Assigned a committee to consider immediate emergency needs and long-range measures designed to attain and maintain health security for the Nation.
- Called attention to the need for trained personnel in preventive health and public health for strategic areas, and pointed out that despite a shortage of personnel now existing there is absence of a national scheme for recruitment and training.
- Emphasized the need for support and use of public health schools and allied courses in training personnel.
- Urged the building of full-time health departments as a must in health security.

### *Schwichtenberg . . . Military and Agency Efforts Alined*

The functions of the Armed Forces Policy Council, the principal agency of the Department of Defense for developing broad policies, plans, and programs in the medical and health fields for the three military departments were described by Brig. Gen. Albert H. Schwichtenberg, M. D., USAF.

The Council's purpose is to bring about the coordination and efficiency in the employment of medical personnel and facilities in the support of specific military missions. General Schwichtenberg reported close association with voluntary health agencies had been developed in the belief that together the over-all medical policies in the national interest could best be developed.

For example, he cited the arrangement made with the American Red Cross to collect whole blood for the Department of Defense by extension of the former's blood-donor program. The whole blood is shipped for immediate use in the Far East, but some of it is processed

[3] Public health in the defense program. Am J Pub Health. 41: 583–586 (1951)

into dried plasma to be used where whole blood cannot be sent or where none is available.

### *Scheele . . . Health Structure Key to Defense*

Medical manpower, facilities, supplies, and services are as essential to national defense as the output of food, steel, and electric power, according to Surgeon General Leonard A. Scheele of the Public Health Service.

Upon the degree of effectiveness of the Federal-State-local health structure will depend the success of blunting an enemy attack through use of military or sabotage methods of biological warfare, he said. A high degree of effectiveness will prevent the interstate spread of communicable diseases provoked by such an attack. Further, communicable disease control involves a well-organized system of epidemiological intelligence based upon prompt and accurate case reporting, identification of disease agents, and application of control measures.

The Public Health Service is the authorized Federal agency for the Nation-wide collection, coordination, and distribution of vital statistics and disease reports, he said. Investigation, identification of biological agents, and control follow prompt reporting of disease outbreaks. He described some of the PHS research programs directed toward solution of critical medical shortages and related civilian and military problems.

### *Kiefer . . . We Can Be Attacked*

Enemy attack in force, with the new special weapons or any of the older, more familiar ones, could be made on our country at any time with little warning, according to Dr. Norvin C. Kiefer, director of the Health Services and Special Weapons Defense Division, Federal Civil Defense Administration.

The major responsibilities of the Health and Special Weapons Division, Dr. Kiefer explained, include casualty services, emergency public health and sanitation, hospital and first-aid systems, special defense measures to protect people, animals, and crops against atomic, radiological, biological and chemical warfare, the provision of necessary supplies, and a number of supporting and related activities.

The Federal Civil Defense Administration is not creating new organizations to deal with these problems. Under its supervision and leadership, however, it is utilizing the services of existing agencies, Dr. Kiefer noted. He also insisted that this is an official program that must be controlled by government authorities and official agencies. The effectiveness of the Nation-wide program depends, however, on the cooperation of many millions of private citizens, he said. The effectiveness of the Health and Special Weapons Defense Program

depends on the utmost cooperation of all professional and technical health personnel, individually or through their professional organizations.

## Tips From England

In keeping with the civilian defense theme, Robert H. Parry, M. D., D. P. H., discussed his World War II experiences as health officer of Bristol, England, which was subjected to 500 air raids

He advised that a sound foundation for civil defense be established on the "old lines" with incorporation into that of any special knowledge concerning defense against the atom bomb.

"We realized very soon that the primary objective of the enemy is not to kill civilians. But if the enemy can cause an enormous amount of destruction and cause civilians to be a nuisance then he has achieved something to upset the war machine in any country. That was one of our great lessons," Dr. Parry said.

Praising the usefulness of voluntary organizations in civilian defense, he said, "They reached many people that official organizations could not reach. We depended too much on planning from the top so we came down a little bit. We started organizing from the individual through the home. The importance of organizing the home and of organizing every individual to play his part cannot be overestimated." He also emphasized:

- Futility of talking about evacuation or anything of that kind. You can't do that in a bombed city. A bombed city is in the front line and every person has to pull his weight.
- The teaching of first-aid techniques to individuals, so that they can recognize how much damage has been done when confronted with an injured person and, by their assistance, reduce the number of calls upon official agencies.

"We believe quite firmly in dispersal," Dr. Parry said. "As public health officers we always favored dispersal. We did not believe that people could stay healthy collected in large groups, in British weather, and under circumstances of war. We thought it best to disperse people; but we were up against the fire fighters. They thought that for people to remain dispersed and in their homes was very dangerous. The lesson of the war, however, was that there wasn't nearly so much fire danger as there was danger from collecting people together in large groups.

"From a public health view," he continued, "we disliked community shelters for other reasons as well. They were difficult to keep dry; they were cold, and they effected a concentration of large numbers of people. We have concluded, therefore, that the best place during

attack is the home and that, with some strengthening, it is by far the safest place for the family." He advised these home-front steps:

- Place a bag of clothes in a convenient place and have a second one put in a different place so that no call need be made upon agencies for clothing in case of an emergency.
- Conduct a house-to-house survey to list available rooms.

"One of the most demoralizing aspects in time of air raid is the sight of one thousand to three thousand people waiting to be taken into a public shelter because their homes have been destroyed. This can be avoided by effective surveys and mutual arrangements," Dr. Parry elaborated.

## Fear Saps Confidence

The growing complexities of civilization require more of intellectually trained men and women than ever before, declared Dr. Detlev W. Bronk, president of Johns Hopkins University, who talked on conservation of human resources. Among his statements were these:

- I do not see how we can escape a recognition of differences in ability, but I would hasten to add that I believe almost all men and women, except the mentally ill, are capable of doing some thing superlatively well if given the freedom to develop latent potentialities and given assistance in helping them find that which they can do superlatively well not only for their own satisfaction but also in the interests of the Nation.
- Natural resources, including human resources, are a proper responsibility of national government. Government does not necessarily assume this full responsibility unless free individual citizens do not fulfill their direct responsibilities.

Deploring the fear, hysteria, dissension and uncertainty manifested today, he said: "It is unthinkable that fear should sap the confidence and courage which are the greatest of our human resources—resources which have given faith to many in the past, faith in the vigor and rightness of American ideals. The preservation of that faith through mutual enterprise and effort, the freeing of men and women from the fear of disease and suffering, the freeing of men from uncertainty of economic limitations—the freeing of men from the specter of fear is the greatest contribution one can make to our national resources."

# Nutrition in the Health Conference of the Preschool Child

By Philip C. Jeans, M. D.*

The objective of a health conference is to promote optimum physical, mental, and emotional health. Attainment of such a goal requires inquiry into many facets of the child's life. Physical examination alone is not enough. A history is essential. A child may appear to be normal physically when actually he may have one or more nutritional deficiencies, or he may be maladjusted in one way or another. A history may point out the need for immunizations; it may bring out emotional, social, or environmental factors that need attention; it may show that the diet is inadequate.

All these things, if at fault, usually cannot be corrected during the limited time at the disposal of the physician, even when the children are scheduled at intervals. The taking of the history allows opportunity for individual discussion with the mother. The conference program should be educational for the mother. She should be taught or persuaded to take her child to her physician for the correction of any faults found.

The chief objective of the health conference is prevention of disease, closely seconded by cure or alleviation of existing disease or defects. Improvement in nutrition is one of the best weapons in fighting and preventing disease. The incidence of certain chronic diseases appears higher in poorly nourished groups. In such groups disease is of longer duration and convalescence is slower than in children of better nourished groups. Improved nutrition is an aid in preventing rheumatic fever and certain other diseases and decreasing recurrence of these diseases.

Nutrition of the preschool child in some respects may be considered more important than that of some other age groups, yet children in this group tend to be neglected. Usually the infant receives excellent nutritional attention. After a child is old enough to feed himself, parental interest is likely to decrease. Appetite decreases with the slowing of growth and the child is permitted to eat what he will. Although a large amount of energy is needed for growth during the first year, relatively little is needed subsequently. The child reaches school age during a period in which relatively little energy is given to growth in length. During this period, however, he is growing physically in other ways. As much as 75 percent of the weight gain is represented by muscle, and an abundance of protein is necessary for

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this type of growth. Protein foods are expensive and therefore are more likely to be left out of the diet. The result is failure of good muscle development. Most 2-year-olds stand erect with good posture. Few 4-year-olds have good posture. Studies of muscle content of the body as judged by creatinine excretion have shown that a large percentage of 3- and 4-year-olds have less skeletal muscle than control groups of children fed ample protein. Children in the well-fed group had excellent posture and were energetic and active. The children fed less well were the reverse. Low protein intakes also are associated with low hemoglobin values.

Often the behavior of children reflects their nutritional state. In general, well-fed children have energy to spare, are very active, and seem to want to investigate everything. Poorly fed children tend to be physically quiet and apparently uninterested in what is going on. Grades in school tend to parallel the nutritional state. In making nutrition surveys, Bessey has used many clinical tests, but he found of value also the behavior of the children. He has stated (*1*), "When we saw groups of children lined up for chemical tests on successive half days (so we had close comparison), we were able to tell which groups were well-nourished and which poorly nourished, by their reactions."

Height-weight measurements are useful, especially if they are far from the mean. However, normal weight for height may not mean good nutrition. In a study of orphanage children, the children were normal in weight for height at the beginning of the study. They were fed a good diet for 3 months. During this time they gained very little weight, but their skeletal muscle increased from 20 to 25 percent. Loss in fat and water balanced gain in muscle. After 3 months the children were stronger and far more active and had better hemoglobin values.

Although there are several good dietary sources of protein, dependence should be placed on milk to a great extent. Milk is an excellent food nutritionally; it not only supplies a high grade of protein but a number of other essentials in substantial quantity. A quart of milk daily supplies most of the protein needs of the young child. Without milk a satisfactory protein intake is not possible with a customary diet.

Milk is also the best food source of calcium. A child in the preschool years requires at least 1 pint of milk daily to supply his calcium needs in addition to the calcium in the remainder of his diet.

At a child health conference the examiner is concerned with the rate of growth, whether or not the child is of average or expected weight or height. While the rate of growth may have a genetic background, usually nutritional factors are much more important. Thus, concern with growth rate means concern with diet and nutrition.

During the preschool years many of the teeth are in the process of development and a good diet is necessary for good tooth structure. It has been shown both in animals and in man that resistance to dental caries can be built into teeth during their development and maturation (*2*, *3*). Also, at any age, including the preschool years, a good diet is a great aid in preventing tooth decay, one of the scourges of the human race.

Improvement in nutritional health is not accomplished solely by advice as to what to eat. Entering into the picture are knowledge of a good diet, price and availability of food, and motivation, all of which must be considered by the family. Experience has shown that a sound dietary regimen to be tried and maintained by a family must be built around family dietary habits. A strange dietary pattern will be rejected, but a few simple additions to the foods in common daily use may be accepted without question.

A child's ability to utilize a good diet depends on many factors other than ingestion of the food. A child who is unhappy, whose sleep is insufficient, who is overfatigued from physical or mental stress has decreased amounts of digestive juices and utilizes food poorly. A nutritional paradox is that poor nutrition itself lowers the efficiency of the gastrointestinal tract, so that even a good diet may not be well absorbed until a considerable period has elapsed after the change in regimen. Studies of children have shown that the highest retention of calcium occurred in the group best fed for years previous to the study. Groups whose height and weight were "normal" but whose nutritional status was poor did not attain the level of retention of the "good" group until the fifth month of improved dietary regimen. The teeth of the two groups also reflected the long term nutritional status. The longer the nutritional status remains suboptimal, the longer the period necessary for rehabilitation. Parents and nutritionists must learn that nutritional improvement may be slow and that visible signs of improved status may not appear for several months after the change of regimen.

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# Preparation of Antisera for Detection of the Somatic Antigens of *Salmonella* Cultures

By P. R. Edwards*

In 1941, Peluffo demonstrated that ethyl alcohol not only did not destroy the agglutinability of V form bacteria in Vi antiserum or the agglutinogenic properties of Vi antigen, but actually preserved these qualities (*4*). Since that time, the writer has consistently used bacteria treated with absolute alcohol and dried *in vacuo* to prepare diagnostic Vi antiserum (*1*). The Ballerup type, formerly known as *Salmonella ballerup* (*3*), is employed since the resulting antiserum can be used without absorption of O and H agglutinins for the detection of Vi antigen in *Salmonella typhi.* There are several advantages in the use of alcohol-treated bacteria. The bacteria to be used for injection can be prepared in sufficient amount to last throughout the period of immunization so that it is not necessary repeatedly to isolate V forms for injection. The treated bacteria are relatively nontoxic. They can be administered in large quantity, and sera of high titer are obtained. The partial inactivation of flagellar antigens by alcohol results in a relatively low H titer which is absorbed easily when pure Vi antiserum is desired.

Recently, Roschka (*5*) described the use of alcohol-acetone treated bacteria in the preparation of O antisera for *Salmonella* typing. By this method, he was able to obtain sera of high titer which were eminently suitable for the determination of O antigens. Since the results reported were much better than those usually obtained by the injection of heated broth cultures, a number of rabbits were injected with antigens prepared by a method similar to that of Roschka. The bacteria were grown on infusion agar plates and removed by washing with saline. After heating at 100° C. for 2 hours, the organisms were sedimented by centrifugation, the saline decanted, and the growth from six agar plates was suspended in 50 ml. of absolute alcohol. After 24 hours at 37° C., the bacteria were again sedimented, and the alcohol was decanted and replaced by an equal volume. After an additional 24 hours at 37° C., the bacteria were again centrifuged and the alcohol replaced with acetone. The cells were taken through two changes of acetone and dried at 37° C. They were then ground to a powder and stored at room temperature.

The dried cells were suspended in sterile saline immediately before injection. At the first injection, 0.5 ml. of a suspension equal in

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density to a 24-hour broth culture was given intravenously. Three succeeding injections were given at 4-day intervals, and the volume of each injection was double that of the preceding one. As the volume was increased, the density of the suspensions also was increased until 200 mg. of dried bacteria were given each animal at the final injection. As noted by Roschka, the rabbits withstood the injections well. Of 48 animals so treated, only 1 died during the course of immunization. This animal succumbed to a *Pasteurella* infection which was endemic in the animal quarters. The rabbits were bled 6 days following the last injection.

Six rabbits each were injected with *Salmonella paratyphi* A, *S. typhi-murium*, *S. thompson*, *S. virginia*, *S. gallinarum*, *S. anatum*, *S. newington*, and *S. senftenberg* to produce the grouping sera used most frequently in *Salmonella* typing. The titers of the individual sera, given in the table, are expressed as ++ end points, that is, the highest dilution in which approximately 50 percent of the cells were agglutinated. Alcohol-treated antigens were used in the tests. Had living antigens been employed, the titers would have been approximately double those recorded. Not only were the sera uniformly acceptable in titer, but they were sufficiently specific to be used without absorption in grouping tests.

Included in the table are the titers of diagnostic sera prepared in the usual manner with boiled broth cultures. Each diagnostic serum consisted of the pooled sera of six rabbits. It should be emphasized, however, that not all the rabbits injected yielded sera of satisfactory titer. Many rabbits were injected and discarded after trial bleeding. While only 6 rabbits were injected to produce the diagnostic sera for groups A and D, 16 were injected for group B serum, 19 for group $C_1$, 14 for group $C_2$, 14 for group $E_1$, 14 for group $E_2$, and 9 for group $E_3$. Thus, 98 rabbits were injected to obtain 48 with suitable titers

It is obvious that, in this series, rabbits injected with alcohol-acetone treated antigens gave a much more uniform agglutinin response than did those injected with heated broth cultures. These

*Homologous titers of sera*

| Rabbit No. | Sera for O groups | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | A | B | $C_1$ | $C_2$ | D | $E_1$ | $E_2$ | $E_3$ |
| 1 | 1, 600 | 800 | 3, 200 | 12, 800 | 6, 400 | 6, 400 | 6, 400 | 1, 600 |
| 2 | 3, 200 | 800 | 3, 200 | 6, 400 | 12, 800 | 6, 400 | 6, 400 | 1, 600 |
| 3 | 6, 400 | 800 | 6, 400 | 6, 400 | 25, 600 | 6, 400 | 3, 200 | 6, 400 |
| 4 | 3, 200 | 1, 600 | 3, 200 | 6, 400 | 25, 600 | 25, 600 | 6, 400 | 6, 400 |
| 5 | 1, 600 | 1, 600 | 3, 200 | 6, 400 | 12, 800 | 12, 800 | 6, 400 | 6, 400 |
| 6 | 800 | ([1]) | 1, 600 | 6, 400 | 12, 800 | 6, 400 | 3, 200 | 12, 800 |
| Diagnostic | 3, 200 | 800 | 6, 400 | 3, 200 | 1, 600 | 6, 400 | 6, 400 | 6, 400 |

[1] Died during immunization.

results confirm those obtained by Roschka and are most encouraging since the production of O grouping sera for *Salmonella* typing previously has been a very uncertain procedure. In passing, it may be said that alcohol and alcohol-acetone treated cultures of *Klebsiella* have been used for the production of anticapsular sera without marked success. In general, these sera were less satisfactory than those obtained by the method of Kauffmann (*2*) in which very young broth cultures were formalinized and used as antigens.

## Summary

Rabbits were injected with *Salmonella* cultures which were heated and subsequently treated with alcohol and acetone by a modification of the method of Roschka. Uniformly high agglutinin titers were obtained, and the sera were eminently suitable for the O grouping of *Salmonella* cultures.

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(*3*) Kauffmann, F., and Moeller, E.: New type of *Salmonella* (*S. ballerup*) with Vi antigen. J. Hyg. **40**: 246–251 (1940).

(*4*) Peluffo, C. A.: Stability of Vi antigen of *Salmonella typhi*. Proc. Soc. Exper. Biol. and Med. **48**: 340–343 (1941).

(*5*) Roschka, R.: Eine neu Methode zur Herstellung Hochaertiger O-Immunseren der *Salmonella* gruppe. Klin. Med. **5**: 88–93 (1950).

# Incidence of Disease

*No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring*

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## UNITED STATES

### Reports From States for Week Ended June 9, 1951

Poliomyelitis cases increased from 116 last week to 171 for the current week. For the week ended June 10, 1950, 207 cases were reported. States which reported 5 or more cases for the current week, with last week's figures shown in parentheses, were: Texas with 34 cases (22); Oklahoma 31 (2); California 19 (25); New York 15 (4); Illinois 10 (3); North Carolina 5 (4); Alabama 5 (5); and Michigan 5 (3). Of the 15 cases reported in New York State, 8 were in New York City.

A total of 18 cases of Rocky Mountain spotted fever was reported for the current week: 10 were in the South Atlantic States, 4 in Wyoming, and 3 in New Jersey.

One case of smallpox was reported in Alabama.

#### Epidemiological Reports

*Infectious Hepatitis*

Dr. G. A. Spendlove, Utah Director of Public Health, stated in a follow-up report that 27 cases of infectious hepatitis have occurred in a city of 9,000 in Salt Lake County since the latter part of January 1951. The infection has smouldered in a square-mile section of the city where housing is poor and septic tank or pit privies are the prevailing type of sewage disposal. It was found that some septic tank effluent reaches the surface and, in some instances, drains into irrigation ditches. Residents of the area recall that a similar disease occurred there in 1942 and 1943. Of the 27 cases this year, 25 developed in 5- to 9-year-old children attending one grammar school, with 7 concentrated in the third grade. Adult cases have occurred in previous years.

Dr. John Emmett, Public Health Service Communicable Disease Center, following an investigation of jaundice in Montrose, Colo., found that infectious hepatitis rather than leptospirosis, as previously suggested, was present in endemic form. About 48 cases could be verified, one-half of which were in children under 15 years of age. The

incubation period appeared to be about 3 to 4 weeks. Epidemiological evidence pointed to spread by direct, intimate contact. One case of serum hepatitis was discovered in the investigation. This illness followed 77 and 84 days, respectively, two infusions of plasma given as a part of the treatment of an illness diagnosed as undulant fever.

*Serum Hepatitis*

Dr. E. W. Colby, Portland, Maine, Health Director, reports the death of 3 of the 14 persons ill with serum hepatitis following the use of thrombin of human origin. More complete information on 12 cases showed that the incubation periods varied from 64 to 154 days. Cases began to appear a few weeks after changing from bovine thrombin to thrombin of human origin. Some of the patients also received blood transfusions during their hospitalization, while others received no blood or plasma. Sterilization of instruments, including syringes and needles, was eliminated as a factor, since the cases occurred on only one of the surgical services where thrombin was used exclusively.

*Disease of Unknown Etiology*

Dr. LeG. B. Byington, Office of Midwestern CDC Services, has reported that six specimens of blood or spinal fluid from persons living in the Red River Valley of North Dakota who had a "bizarre" disease were examined with negative results. This outbreak previously reported is still under investigation.

*Influenza*

Dr. J. A. Pons, Puerto Rico Commissioner of Health, has reported that the epidemic of influenza which began on the Island about 2 months ago is now waning rapidly. For the 3 weeks ended May 26, June 2 and 9, 7,098, 10,276 and 4,007 cases, respectively, were notified. The disease has remained mild. Type A-prime influenza virus was isolated from throat washings.

*Possible Poisoning by Insecticide*

Dr. G. A. Spendlove has reported illnesses in Millard County, Utah, which followed the use of parathion used for control of insects. A considerable area of the county is affected. The Communicable Disease Center, Atlanta, Ga., is conducting an investigation at the request of the State Director of Health.

*Salmonella Food Infection Outbreak*

Dr. R. R. Cross, Illinois Director of Health, has reported an extensive but mild outbreak of gastroenteritis in Chicago on May 29. Of the 680 persons exposed to infection, 340 became ill. *Salmonella montevideo* was isolated from a specimen of food examined.

## *Comparative Data for Cases of Specified Reportable Diseases: United States*

[Numbers after diseases are International List numbers, 1948 revision]

| Disease | Total for week ended— | | 5-year median 1946–50 | Seasonal low week | Cumulative total since seasonal low week | | 5-year median 1945–46 through 1949–50 | Cumulative total for calendar year— | | 5-year median 1946–50 |
|---|---|---|---|---|---|---|---|---|---|---|
| | June 9, 1951 | June 10, 1950 | | | 1950–51 | 1949–50 | | 1951 | 1950 | |
| Anthrax (062) | 2 | 1 | 1 | (1) | (1) | (1) | (1) | 38 | 19 | 24 |
| Diphtheria (055) | 53 | 69 | 138 | 27th | 4, 727 | 7, 157 | 10, 570 | 1, 820 | 2, 886 | 4, 212 |
| Encephalitis, acute infectious (082) | 25 | 12 | 8 | (1) | (1) | (1) | (1) | [2] 394 | 295 | 201 |
| Influenza (480–483) | 449 | 578 | 408 | 30th | 128, 197 | 147, 562 | 147, 562 | 113, 655 | 136, 978 | 126, 724 |
| Measles (085) | 18, 492 | 14, 273 | 16, 813 | 35th | 130, 460 | 253, 699 | 503, 970 | 401, 759 | 234, 570 | 409, 024 |
| Meningitis, meningococcal (057.0) | 74 | 75 | 60 | 37th | 3, 227 | 2, 973 | 2, 914 | 2, 266 | 2, 059 | 1, 942 |
| Pneumonia (490–493) | 863 | 1, 513 | (3) | (1) | (1) | (1) | (1) | [4] 40,128 | 52, 245 | (3) |
| Poliomyelitis, acute (080) | 171 | 207 | 207 | 11th | [5] 936 | 1, 087 | 1, 087 | [5] 2, 149 | 2, 218 | 1, 445 |
| Rocky Mountain spotted fever (104) | 18 | 23 | 23 | (1) | (1) | (1) | (1) | 80 | 99 | 105 |
| Scarlet fever (050) [6] | 1, 279 | 946 | 1, 530 | 32d | [7] 64,036 | 52, 909 | 76, 621 | [7] 48,345 | 36, 470 | 54, 080 |
| Smallpox (084) | 1 | 1 | 1 | 35th | 14 | 43 | 66 | 6 | 23 | 45 |
| Tularemia (059) | 15 | 12 | 28 | (1) | (1) | (1) | (1) | 314 | 446 | 446 |
| Typhoid and paratyphoid fever (040, 041) [8] | 54 | 65 | 79 | 11th | 517 | 669 | 679 | 952 | 1, 179 | 1, 179 |
| Whooping cough (056) | 1, 560 | 3, 150 | 1, 886 | 39th | [9] 56,949 | 83, 036 | 77, 605 | [9] 35,347 | 61, 500 | 46, 339 |

[1] Not computed.
[2] Deduction: North Carolina, week ended May 10, 1 case.
[3] Data not available.
[4] Additions, week ended June 2: Florida 16 cases; Utah 3.
[5] Additions: Arkansas, weeks ended February 3, April 14, and May 19, 1 case each; Mississippi, week ended May 26, 1 case.
[6] Including cases reported as streptococcal sore throat.
[7] Addition: Alabama, week ended June 2, 9 cases.
[8] Including cases reported as salmonellosis.
[9] Addition: West Virginia, week ended June 2, 43 cases.

## Reported Cases of Selected Communicable Diseases: United States, Week Ended June 9, 1951

[Numbers under diseases are International List numbers, 1948 revision]

| Area | Diphtheria (055) | Encephalitis, infectious (082) | Influenza (480–483) | Measles (085) | Meningitis, meningococcal (057.0) | Pneumonia (490–493) | Poliomyelitis (080) |
|---|---|---|---|---|---|---|---|
| **United States** | **53** | **25** | **449** | **18,492** | **74** | **863** | **171** |
| **New England** | **5** | **2** | | **1,238** | | **6** | **1** |
| Maine | 1 | | | 19 | | | |
| New Hampshire | | | | 42 | | | |
| Vermont | | | | 69 | | | |
| Massachusetts | 4 | 2 | | 696 | | | |
| Rhode Island | | | | 25 | | 2 | |
| Connecticut | | | | 387 | | 4 | 1 |
| **Middle Atlantic** | **3** | **10** | **3** | **4,258** | **14** | **146** | **18** |
| New York | 1 | 7 | [1] 1 | 1,652 | 4 | 34 | 15 |
| New Jersey | | 3 | 2 | 1,419 | 3 | 70 | 3 |
| Pennsylvania | 2 | | | 1,187 | 7 | 42 | |
| **East North Central** | **2** | **5** | **16** | **3,051** | **12** | **105** | **19** |
| Ohio | | | | 724 | 2 | | 3 |
| Indiana | | 1 | 9 | 81 | 1 | | |
| Illinois | | | | 608 | 4 | 38 | 10 |
| Michigan | | 2 | 7 | 548 | 4 | 67 | 5 |
| Wisconsin | 2 | 2 | | 1,090 | 1 | | 1 |
| **West North Central** | **2** | **1** | **6** | **906** | **8** | **130** | **8** |
| Minnesota | 2 | | 2 | 113 | | 11 | 2 |
| Iowa | | | | 204 | | 3 | |
| Missouri | | | 3 | 155 | 6 | 1 | 3 |
| North Dakota | | 1 | | 98 | 1 | 111 | 1 |
| South Dakota | | | | 28 | | 1 | 1 |
| Nebraska | | | | 12 | | | |
| Kansas | | | 1 | 296 | 1 | 3 | 1 |
| **South Atlantic** | **14** | **1** | **164** | **1,853** | **10** | **101** | **15** |
| Delaware | | | | 37 | | | |
| Maryland | | | | 354 | 2 | 24 | |
| District of Columbia | | | | 46 | | 16 | |
| Virginia | 3 | | 155 | 794 | 1 | 41 | 1 |
| West Virginia | 1 | | | 274 | 2 | | 1 |
| North Carolina | 5 | | | 65 | 2 | | 5 |
| South Carolina | | | 6 | 34 | 1 | 3 | 3 |
| Georgia | 4 | | 3 | 146 | | 17 | 1 |
| Florida | 1 | 1 | | 103 | 2 | | 4 |
| **East South Central** | **4** | **1** | **6** | **635** | **4** | **45** | **9** |
| Kentucky | | | | 372 | 1 | 3 | |
| Tennessee | 1 | | | 88 | 1 | | 1 |
| Alabama | 1 | | | 154 | 2 | 21 | 5 |
| Mississippi | 2 | 1 | 6 | 21 | | 21 | 3 |
| **West South Central** | **14** | | **101** | **1,601** | **9** | **220** | **73** |
| Arkansas | | | 50 | 162 | | 17 | 1 |
| Louisiana | 4 | | 2 | 54 | 1 | 37 | 7 |
| Oklahoma | 2 | | 49 | 171 | 1 | 25 | 31 |
| Texas | 8 | | | 1,214 | 7 | 141 | 34 |
| **Mountain** | **2** | **1** | **111** | **770** | **6** | **59** | **7** |
| Montana | 1 | | 5 | 69 | | | |
| Idaho | | | | 94 | | | |
| Wyoming | | | | 91 | | 3 | 1 |
| Colorado | | | 1 | 77 | 3 | 20 | 2 |
| New Mexico | | | 1 | 88 | 2 | 21 | |
| Arizona | | 1 | 104 | 258 | 1 | 15 | 4 |
| Utah | 1 | | | 93 | | | |
| Nevada | | | | | | | |
| **Pacific** | **7** | **4** | **42** | **4,180** | **11** | **51** | **21** |
| Washington | 1 | | 8 | 399 | | | |
| Oregon | 1 | | 19 | 460 | 3 | 7 | 2 |
| California | 5 | 4 | 15 | 3,321 | 8 | 44 | 19 |
| Alaska | | | | | | | |
| Hawaii | | | | 31 | | | |

[1] New York City only.
*Anthrax:* New Jersey and Pennsylvania, 1 case each.

## Reported Cases of Selected Communicable Diseases: United States, Week Ended June 9, 1951—Continued

[Numbers under diseases are International List numbers, 1948 revision]

| Area | Rocky Mountain spotted fever (104) | Scarlet fever (050) | Smallpox (084) | Tularemia (059) | Typhoid and paratyphoid fever [1] (040, 041) | Whooping cough (056) | Rabies in animals |
|---|---|---|---|---|---|---|---|
| **United States** | 18 | 1,279 | 1 | 15 | 54 | 1,566 | 149 |
| **New England** | | 118 | | | 2 | 51 | |
| Maine | | 11 | | | | 14 | |
| New Hampshire | | [2] 1 | | | | 3 | |
| Vermont | | 5 | | | | | |
| Massachusetts | | 76 | | | 2 | 23 | |
| Rhode Island | | 4 | | | | | |
| Connecticut | | 18 | | | | 11 | |
| **Middle Atlantic** | 3 | 332 | | | 13 | 143 | 23 |
| New York | | [2] 225 | | | 2 | 47 | 7 |
| New Jersey | 3 | 43 | | | 2 | 56 | |
| Pennsylvania | | 64 | | | 9 | 40 | 16 |
| **East North Central** | | 392 | | 1 | 5 | 165 | 3 |
| Ohio | | 116 | | | 2 | 35 | 2 |
| Indiana | | 12 | | | | 19 | |
| Illinois | | 43 | | 1 | 2 | 26 | 1 |
| Michigan | | 199 | | | | 55 | |
| Wisconsin | | 22 | | | 1 | 30 | |
| **West North Central** | | 41 | | | 1 | 67 | 40 |
| Minnesota | | 14 | | | 1 | | 5 |
| Iowa | | 5 | | | | 16 | 17 |
| Missouri | | 14 | | | | 11 | 17 |
| North Dakota | | 2 | | | | 6 | |
| South Dakota | | 1 | | | | | |
| Nebraska | | 2 | | | | | |
| Kansas | | 3 | | | | 34 | 1 |
| **South Atlantic** | 10 | 72 | | 7 | 14 | 166 | 16 |
| Delaware | 1 | 2 | | | | | |
| Maryland | 3 | 16 | | | 1 | 6 | |
| District of Columbia | | 7 | | | | 2 | |
| Virginia | 3 | 8 | | | 3 | 40 | 6 |
| West Virginia | | 5 | | | | | 1 |
| North Carolina | 3 | 23 | | 1 | | 48 | |
| South Carolina | | 3 | | | 3 | 17 | 4 |
| Georgia | | 7 | | 6 | 6 | 35 | 5 |
| Florida | | [2] 1 | | | 1 | 18 | |
| **East South Central** | 1 | 20 | 1 | 1 | 3 | 285 | 27 |
| Kentucky | | 6 | | | | 189 | 15 |
| Tennessee | | 9 | | | 1 | 32 | 9 |
| Alabama | | 2 | 1 | | 1 | 51 | 1 |
| Mississippi | 1 | 3 | | 1 | 1 | 13 | 2 |
| **West South Central** | | 36 | | 2 | 8 | 473 | 37 |
| Arkansas | | 2 | | | | 44 | 5 |
| Louisiana | | 8 | | | 4 | 4 | |
| Oklahoma | | 6 | | | 1 | 41 | 7 |
| Texas | | 20 | | 2 | 3 | 384 | 25 |
| **Mountain** | 4 | 30 | | 3 | 5 | 103 | 1 |
| Montana | | 5 | | 2 | 1 | 10 | |
| Idaho | | 3 | | | | | |
| Wyoming | 4 | 1 | | | 1 | 9 | |
| Colorado | | 5 | | | | 19 | 1 |
| New Mexico | | | | | 2 | 10 | |
| Arizona | | 2 | | | 1 | 49 | |
| Utah | | [2] 14 | | 1 | | 6 | |
| Nevada | | | | | | | |
| **Pacific** | | 238 | | 1 | 3 | 113 | 2 |
| Washington | | 22 | | | | 18 | |
| Oregon | | 17 | | | 1 | 13 | |
| California | | [2] 199 | | 1 | 2 | 82 | 2 |
| Alaska | | | | | | | |
| Hawaii | | 2 | | | | | |

[1] Including cases reported as salmonellosis. [2] Including cases reported as streptococcal sore throat.

# FOREIGN REPORTS

## CANADA

*Reported Cases of Certain Diseases—Week Ended May 19, 1951*

| Disease | Total | New-foundland | Prince Edward Island | Nova Scotia | New Bruns-wick | Que-bec | On-tario | Mani-toba | Sas-katch-ewan | Al-berta | British Co-lum-bia |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Brucellosis | 2 | - | - | - | - | 2 | - | - | - | - | - |
| Chickenpox | 940 | - | - | 24 | 1 | 170 | 433 | 28 | 6 | 57 | 221 |
| Diphtheria | 8 | - | - | - | - | 8 | - | - | - | - | - |
| Dysentery, bacillary | 8 | - | - | - | - | 4 | 3 | - | - | - | 1 |
| Encephalitis, infectious | 1 | - | - | 1 | - | - | - | - | - | - | - |
| German measles | 411 | - | - | 10 | - | 25 | 213 | - | 24 | 39 | 100 |
| Influenza | 43 | - | - | 26 | 1 | - | 3 | 8 | - | - | 5 |
| Measles | 1,430 | 2 | - | 89 | 4 | 266 | 421 | 177 | 31 | 262 | 178 |
| Meningitis, meningococcal | 4 | - | - | - | - | - | 1 | - | 1 | - | 2 |
| Mumps | 669 | - | - | 12 | 1 | 237 | 219 | 27 | 54 | 44 | 75 |
| Poliomyelitis | 3 | - | - | - | - | 1 | 2 | - | - | - | - |
| Scarlet fever | 394 | 3 | - | 1 | 3 | 129 | 37 | 47 | 14 | 42 | 118 |
| Tuberculosis (all forms) | 195 | 14 | - | 8 | 11 | 71 | 8 | 19 | 10 | 11 | 43 |
| Typhoid and paratyphoid fever | 14 | 3 | - | - | - | 8 | - | - | - | - | 3 |
| Venereal diseases: | | | | | | | | | | | |
| Gonorrhea | 238 | 6 | - | 10 | 13 | 62 | 51 | 18 | 12 | 23 | 43 |
| Syphilis | 99 | 7 | - | 5 | 3 | 36 | 23 | 4 | 9 | 4 | 8 |
| Primary | 7 | - | - | - | - | 1 | 5 | - | - | 1 | - |
| Secondary | 5 | - | - | - | - | 4 | - | - | - | - | 1 |
| Other | 87 | 7 | - | 5 | 3 | 31 | 18 | 4 | 9 | 3 | 7 |
| Whooping cough | 146 | - | - | - | 1 | 26 | 53 | 4 | 5 | 28 | 29 |

## FINLAND

*Reported Cases of Certain Diseases—April 1951*

| Disease | Cases | Disease | Cases |
|---|---|---|---|
| Diphtheria | 39 | Typhoid fever | 7 |
| Meningitis, meningococcal | 7 | Venereal diseases: | |
| Paratyphoid fever | 27 | Gonorrhea | 418 |
| Poliomyelitis | 5 | Syphilis | 22 |
| Scarlet fever | 1,925 | Other forms | 3 |

## WORLD DISTRIBUTION OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER

**The following tables are not complete or final for the list of countries included or for the figures given. Since many of the figures are from weekly reports, the accumulated totals are for approximate dates.**

### CHOLERA

(Cases)

| Place | January–March 1951 | April 1951 | May 1951—week ended— | | | |
|---|---|---|---|---|---|---|
| | | | 5 | 12 | 19 | 26 |
| ASIA | | | | | | |
| Burma | 603 | 442 | 117 | 96 | 73 | [1] 28 |
| Akyab | 7 | - | - | - | - | - |
| Bassein | 89 | 139 | 65 | 35 | 13 | 7 |
| Mergui | - | - | 17 | 47 | 31 | - |
| Moulmein | 87 | 81 | 3 | 4 | 20 | 20 |
| Rangoon | 11 | 11 | 7 | 2 | - | [2] 1 |

See footnotes at end of table.

## CHOLERA—Continued

| Place | January–March 1951 | April 1951 | May 1951—week ended— | | | |
|---|---|---|---|---|---|---|
| | | | 5 | 12 | 19 | 26 |
| ASIA—continued | | | | | | |
| India | 29, 208 | 6, 744 | [1] 1, 305 | [1] 958 | [1] 541 | [1] 302 |
| Bombay | 1 | 2 | | | | |
| Calcutta | 1, 193 | 895 | 337 | 281 | 253 | 286 |
| Cuddalore | 7 | | | | | |
| Lucknow | | | | 2 | 1 | |
| Madras | 118 | 26 | 9 | 11 | 26 | 13 |
| Nagpur | 67 | 1 | | | | |
| Negapatam | 87 | | | | | |
| Tiruchirappali | 100 | | | | 2 | 3 |
| Tuticorin | 29 | 5 | | | | |
| India (French): | | | | | | |
| Karikal | 36 | | | | | |
| Pondicherry | 138 | 6 | | | | |
| Indochina: | | | | | | |
| Cambodia | 35 | [3] 2 | | [3] 2 | | [3] 2 |
| Viet Nam | 8 | 11 | 2 | | 1 | 1 |
| Cantho | | 2 | | | | |
| Haiphong | 3 | | | | | |
| Soc Trang | 2 | | | | | |
| Pakistan | 5, 100 | 4, 167 | 826 | [1] 376 | [1] 153 | [1] 7 |
| Chittagong | 11 | 15 | 2 | 4 | 3 | 7 |
| Dacca | 32 | 14 | 3 | | 2 | |
| Thailand | | 1 | | | | |

[1] Preliminary. [2] Includes imported cases. [3] Suspected.

## PLAGUE

(Cases)

| Place | January–March 1951 | April 1951 | May 1951—week ended— | | | |
|---|---|---|---|---|---|---|
| | | | 5 | 12 | 19 | 26 |
| AFRICA | | | | | | |
| Belgian Congo | 10 | 1 | | | | 1 |
| Stanleyville Province | 10 | 1 | | | | 1 |
| British East Africa: | | | | | | |
| Tanganyika | [1] 19 | 20 | | | | |
| Madagascar | 100 | 18 | | [2] 3 | [3] 1 | |
| Union of South Africa | 1 | 6 | | | | |
| Orange Free State | 1 | 6 | | | | |
| ASIA | | | | | | |
| Burma | 195 | 15 | 5 | 3 | 2 | |
| Rangoon | | [4] 1 | | | | |
| Tavoy | 2 | | | | | |
| India | 4, 503 | 1, 170 | [5] 75 | [5] 96 | [5] 49 | [5] 4 |
| Allahabad | [4] 36 | [4] 73 | [4] 6 | [4] 3 | [4] 4 | [4] 4 |
| Bombay | 1 | | | | | |
| Calcutta | 2 | 14 | 4 | | | |
| Cawnpore | 2 | 6 | | | | |
| Lucknow | 12 | 3 | | | | |
| Nagpur | 10 | 1 | | | | |
| Indochina: | | | | | | |
| Cambodia | 6 | 1 | | | | |
| Pnom Penh | 6 | 1 | | | | |
| Viet Nam | 18 | 27 | 12 | 12 | 2 | 2 |
| Phanthiet | 13 | 11 | 5 | 9 | 2 | |
| Phu Kok Island | | 9 | 7 | 3 | | |
| Indonesia: | | | | | | |
| Java | 4 | 1 | | | | |
| Bandoeng | | 1 | | | | |
| Djakarta | [4] 1 | | | | | |
| Jogjakarta | 2 | | | | | |
| Semarang | [4] 1 | | | | | |
| Madura | | 12 | | | | |
| Timbang | | 12 | | | | |
| Thailand | 7 | | | | | |
| SOUTH AMERICA | | | | | | |
| Ecuador | 12 | 2 | | | | |
| Chimborazo Province | 8 | | | | | |
| Loja Province | 4 | 2 | | | | |

[1] Includes suspected cases. [2] May 1–10, 1951. [3] May 11–20, 1951. [4] Imported. [5] Preliminary figure.

## SMALLPOX

(Cases)

| Place | January-March 1951 | April 1951 | May 1951—week ended— 5 | 12 | 19 | 26 |
|---|---|---|---|---|---|---|
| **AFRICA** | | | | | | |
| Algeria | 38 | 6 | | | | |
| Bechuanaland | 119 | | | | | |
| Belgian Congo | 681 | 252 | 51 | 60 | 82 | |
| British East Africa: | | | | | | |
| Kenya | 1 | | | | | |
| Nyasaland | 22 | 14 | 2 | | | |
| Tanganyika | 117 | 20 | | | | |
| Uganda | | 1 | 1 | | | |
| Cameroon (British) | 5 | | | | | |
| Cameroon (French) | 64 | 19 | | [1] 32 | | |
| Egypt | 1 | | | | | |
| Ethiopia | 5 | | | | | |
| French Equatorial Africa | 45 | 43 | | | [2] 1 | |
| French West Africa | 1,145 | 830 | | [1] 72 | [2] 109 | |
| Dahomey | 290 | 50 | | [1] 5 | [2] 14 | |
| Guinea | 9 | | | | | |
| Ivory Coast | 102 | 80 | | [1] 2 | [2] 24 | |
| Mauritania | | 6 | | | | |
| Niger Territory | 220 | 518 | | [1] 15 | [2] 17 | |
| Senegal | 2 | 1 | | | | |
| Sudan | 357 | 140 | | [1] 44 | [2] 47 | |
| Upper Volta | 165 | 35 | | [1] 6 | [2] 7 | |
| Gambia | 1 | | | | | |
| Gold Coast | 304 | 29 | | | | |
| Morocco (French) | 6 | | | | | |
| Mozambique | 83 | 5 | 1 | | | |
| Nigeria | 3,348 | 1,016 | | | | |
| Rhodesia: | | | | | | |
| Southern | 237 | 16 | | | | |
| Sierra Leone | 22 | | | | | |
| Sudan (Anglo-Egyptian) | 16 | 2 | | | | |
| Togo (French) | 30 | | | [1] 5 | | |
| Tunisia | 1 | 1 | | | | |
| Union of South Africa | 319 | | | 1 | | |
| **ASIA** | | | | | | |
| Afghanistan | 163 | 70 | | | | |
| Arabia | 2 | | | | | |
| Aden | [3] 1 | | | | | |
| Oman | 1 | | | | | |
| Burma | 478 | 78 | 9 | 6 | 4 | |
| Ceylon | 10 | 1 | 2 | 2 | 26 | 3 |
| China | 4 | | | | | |
| India | 118,385 | 42,709 | [4] 5,805 | [4] 3,584 | [4] 2,325 | [4] 175 |
| India (French) | 1,750 | 335 | 68 | 53 | 26 | |
| India (Portuguese) | 102 | 13 | | | | |
| Indochina: | | | | | | |
| Cambodia | 75 | | | 1 | 1 | |
| Viet Nam | 171 | 263 | 103 | 145 | 183 | 97 |
| Indonesia: | | | | | | |
| Borneo | 847 | 186 | | | | |
| Java | 106 | 25 | 2 | 1 | 5 | 6 |
| Iran | 209 | 19 | | 3 | 1 | 7 |
| Iraq | 111 | 10 | | 3 | 5 | 5 |
| Japan | 23 | | | | | |
| Korea | 195 | | | | | |
| Pakistan | 20,039 | 7,338 | 1,480 | 320 | 200 | 15 |
| Straits Settlements | 1 | | | | | |
| Thailand | 32 | 1 | | | | |
| Turkey | 32 | 120 | | | | |
| **EUROPE** | | | | | | |
| Great Britain: | | | | | | |
| England: Brighton | 15 | | | | | |
| Portugal | 1 | | | | | |
| Netherlands | | 19 | 31 | 19 | 2 | |
| **SOUTH AMERICA** | | | | | | |
| Brazil | 3 | | | | | |
| British Guiana | 11 | | | | | |
| Colombia | 20 | 5 | | | | |
| Ecuador | 82 | 16 | | | | |
| Paraguay | 20 | | | | | |
| Venezuela | 16 | | | | | |

[1] May 1-10, 1951. [2] May 11-20, 1951. [3] Imported. [4] Preliminary figure.

## TYPHUS FEVER*

(Cases)

| Place | January-March 1951 | April 1951 | May 1951—week ended— 5 | 12 | 19 | 26 |
|---|---|---|---|---|---|---|
| **AFRICA** | | | | | | |
| Algeria | 10 | 29 | | [1] 1 | | |
| Belgian Congo | 1 | | | | | |
| British East Africa: | | | | | | |
| Kenya | 9 | | | | | |
| Somaliland | 1 | | | | | |
| Uganda | 1 | 1 | 2 | | | |
| Zanzibar | | | | | 1 | |
| Egypt | 51 | 9 | | | | |
| Eritrea | 6 | 3 | | | 3 | 1 |
| Ethiopia | 238 | 49 | | | | |
| Gold Coast | 2 | | | | | |
| Libya: | | | | | | |
| Cyrenaica | 1 | | 1 | | | 1 |
| Tripolitania | 2 | 5 | 1 | 2 | | |
| Morocco (French) | 2 | | | | | |
| Morocco (Spanish) | 10 | | | | | |
| Nigeria | | 1 | | | | |
| Tunisia | 1 | 10 | | [1] 2 | | |
| Union of South Africa | 23 | | | | | |
| **ASIA** | | | | | | |
| Afghanistan | 159 | 130 | | | | |
| Ceylon | 1 | | | | | |
| India | 32 | 10 | 4 | 8 | 2 | 1 |
| India (Portuguese) | 25 | 3 | 1 | | | |
| Indochina: Viet Nam | 16 | 9 | 6 | | | |
| Iran | 162 | 33 | 6 | 4 | 6 | 4 |
| Iraq | 14 | | | | | |
| Israel | 2 | | | | | |
| Japan | 6 | | | | | |
| Korea | 27 | | | | | |
| Pakistan | 7 | 4 | 2 | | | |
| Syria | 1 | | | | | |
| Transjordan | 35 | 4 | | 1 | | 2 |
| Turkey | 60 | 16 | 2 | 3 | 5 | 7 |
| **EUROPE** | | | | | | |
| Great Britain: | | | | | | |
| Island of Malta | 1 | | | | | |
| Portugal | 3 | | | | | |
| Sicily | 5 | | | | | |
| Yugoslavia | 178 | | | | | |
| **NORTH AMERICA** | | | | | | |
| Costa Rica | [2] 5 | | | | | |
| Guatemala | 1 | | | | | |
| El Salvador | [2] 4 | | | | | |
| Jamaica | [2] 2 | [2] 4 | | [2] 1 | [2] 1 | |
| Mexico | [3] 29 | 11 | | | | |
| Puerto Rico | | 1 | | | | |
| **SOUTH AMERICA** | | | | | | |
| Chile | 41 | 21 | 7 | 4 | | |
| Colombia | 26 | 6 | | | | |
| Ecuador | [3] 235 | [3] 77 | | | | |
| Paraguay | 11 | | | | | |
| Venezuela | [2] 2 | | | | | |

*Reports from some areas are probably murine type, while others include both murine and louse-borne types.
[1] May 1-10, 1951. [2] Murine. [3] Includes murine type.

## YELLOW FEVER

(C—cases; D—deaths)

| Place | | January-March 1951 | April 1951 | May 1951—week ended— 5 | 12 | 19 | 26 |
|---|---|---|---|---|---|---|---|
| **AFRICA** | | | | | | | |
| Gold Coast | C | [1] 8 | [1] 14 | | [2] 4 | | |
| Accra | C | 4 | [2] 1 | | | | |
| Adeiso | C | 2 | [2] 5 | | | | |
| Nigeria | C | | [2] 1 | | | | |
| Eziachi | C | | [2] 1 | | | | |
| Sierra Leone | C | [2] 2 | | | | | |
| Koinadugu District | C | [2] 2 | | | | | |
| Freetown | C | [2] 2 | | | | | |

See footnotes at end of table.

YELLOW FEVER—Continued

| Place | | January–March 1951 | April 1951 | May 1951—week ended— 5 | 12 | 19 | 26 |
|---|---|---|---|---|---|---|---|
| NORTH AMERICA | | | | | | | |
| Panama | C | | 1 | | | | |
| Bocas Del Toro Province | C | | 1 | | | | |
| SOUTH AMERICA | | | | | | | |
| Brazil | D | [3] 400 | | | | | |
| Goiaz State | D | [3] 400 | | | | | |
| Anapoli | D | [4] 1 | | | | | |
| Goiania | D | [4] 2 | | | | | |
| Goiaz | D | [4] 5 | | | | | |
| Inhumas | D | [4] 1 | | | | | |
| Jaraqua | D | [4] 6 | | | | | |
| Mineiros | D | [4] 2 | | | | | |
| Niquelandia | D | [4] 3 | | | | | |
| Pirenopolis | D | [4] 1 | | | | | |
| Porangatu | D | [4] 1 | | | | | |
| Rio Verde | D | [4] 2 | | | | | |
| Uruacu | D | [4] 2 | | | | | |
| Matto Grosso State | D | 2 | | | | | |
| Colombia | D | 13 | | | | | |
| Boyaca Department | D | 1 | | | | | |
| Otanche | D | 1 | | | | | |
| Caqueta Commissary | D | 2 | | | | | |
| Montanita | D | 1 | | | | | |
| Meta Territory | D | 1 | | | | | |
| North Santander Department | D | 3 | | | | | |
| La Vega | D | 3 | | | | | |
| Santander Department | D | 6 | | | | | |
| Campohermoso | D | 1 | | | | | |
| Guamales | D | 1 | | | | | |
| Maradales | D | 1 | | | | | |
| Tambo Redondo | D | 1 | | | | | |
| Veneoas | D | 1 | | | | | |
| Ecuador | C | [5] 61 | | | | | |
| Esmeraldas Province | D | 1 | | | | | |
| Atacames | D | 1 | | | | | |
| Quininde | D | 1 | | | | | |
| Santo Domingo de Los Colorados | C | [5] 58 | | | | | |
| San Meguel | D | 1 | | | | | |
| Peru | D | 2 | | | | | |
| Junin Department | D | 1 | | | | | |
| San Martin Department | D | 1 | | | | | |

[1] Includes suspected cases. [2] Suspected. [3] The number of deaths Dec. 1–Feb. 20, 1951, was estimated to be 400 and the number of cases was estimated to be 2,000. [4] Confirmed deaths. [5] Corrected figure.

## Sylvatic Plague in Lincoln County, Wash.

Dr. V. B. Link, Western CDC Laboratory of the Public Health Service reports that specimen 51 WB–11, consisting of 11 fleas, *Megabothris clantoni clantoni*, from 8 sage brush voles, *Lagurus curtatus*, were found to be plague positive. These voles were trapped 5 miles south of Wilbur on State Highway 4B on May 10, 1951.

## Examination for Medical Officers

A competitive examination for the appointment of medical officers in the Regular Commissioned Corps of the Public Health Service will be held in various cities throughout the country on September 4, 5, and 6, 1951. The examination will include professional written tests, an oral interview, and a physical examination. Completed applications must be in the Washington office by August 6, 1951.

Appointments will be made in the grades of assistant surgeon and senior assistant surgeon, equivalent to Navy ranks of lieutenant (j. g.) and lieutenant, respectively. Entrance pay for officers with dependents is $5,686 in the assistant grade and $6,546 in the senior assistant grade. These salaries include the $1,200 annual additional pay received by medical officers as well as subsistence and rental allowance.

Assistant surgeon applicants must have at least 7 years of post high school educational training and professional experience; the senior assistant, 10 years. Applicants who will complete their internships by June 1952 may take the examination.

For application forms and additional information write to: Surgeon General, Public Health Service, Federal Security Agency, Washington, D. C., attention: Division of Commissioned Officers, Desk A.

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It contains (1) current information regarding the incidence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

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